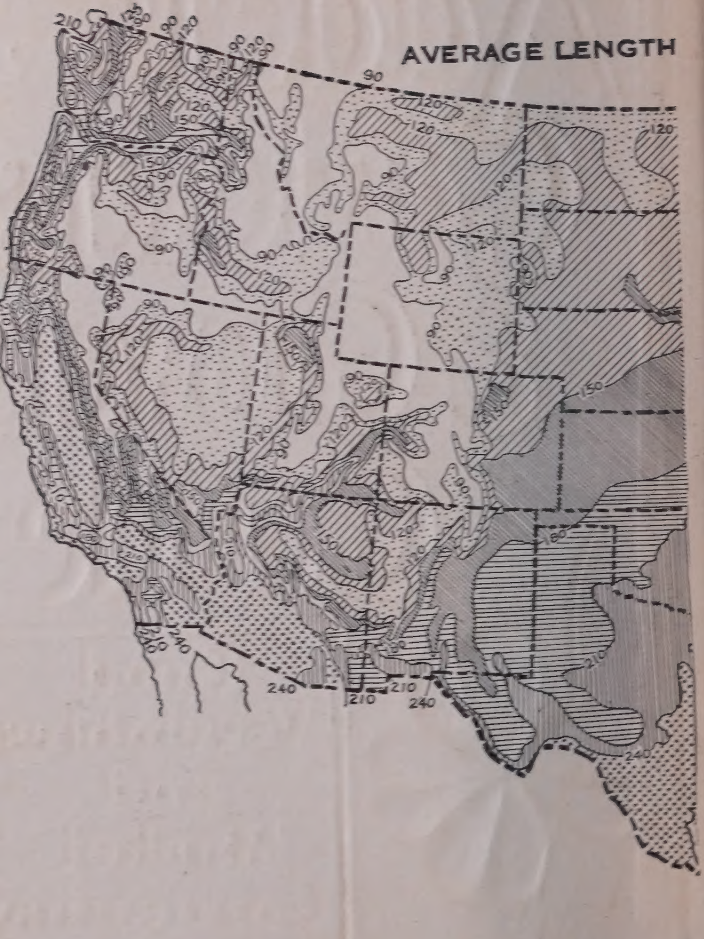
Audels Gardeners & Growers Guide

Good Vegetables and Market Gardening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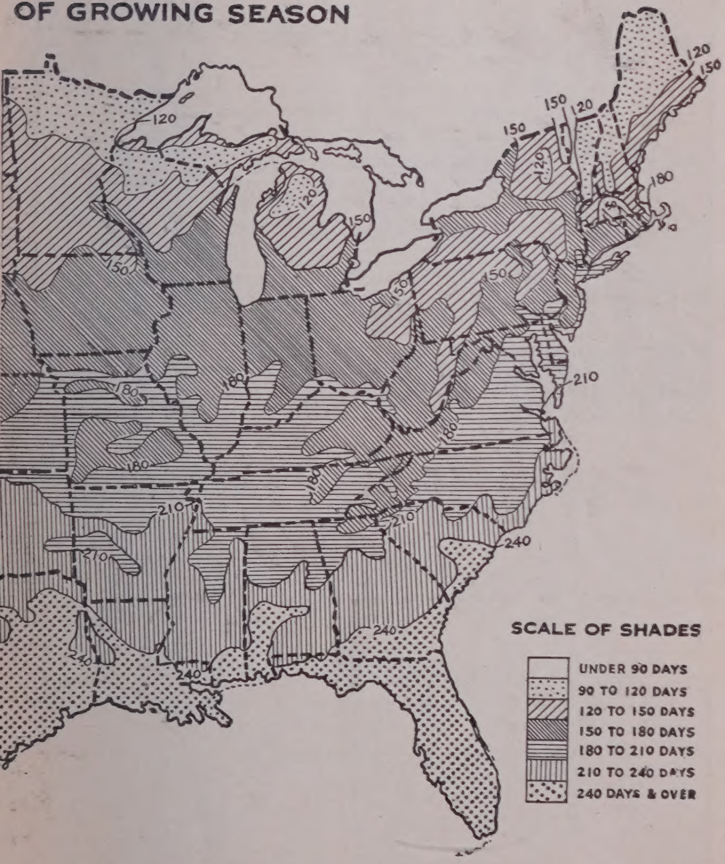

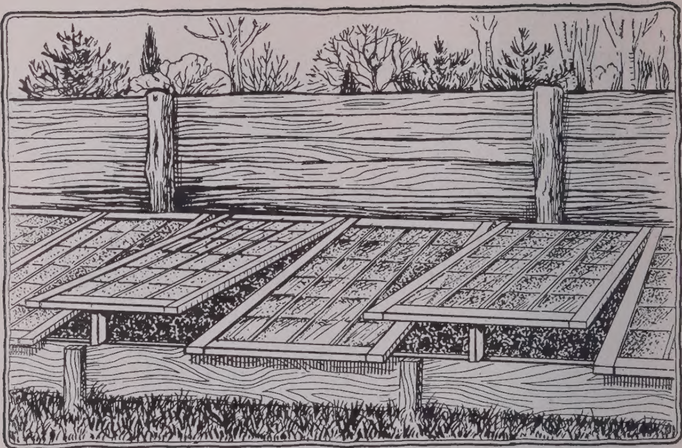

SASH COVERED FRAMES, SHOWING WINDBREAK

In the abundance of the yield is the joy and glory of the husbandman.

Audels Gardeners and Growers Guide

Volume 2

Presenting in a handy form a wealth of
information, instructions and suggestions on
planting, cultivating and harvesting

Good Vegetables
FOR
Home and Market

TOGETHER WITH
Practical and helpful illustrations-Useful and
valuable tables of requirements for field and garden

BY
Edward C. Vick

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Foreword—

THE book of nature is open, but its wonderful beauties and mysteries are revealed only to the careful student.

In the following pages will be found plain instructions and suggestions alike valuable to the beginner and to the experienced gardener.

Every plant has peculiarities which must be studied in connection with the soil, climate and other conditions which surround it.

This book will act as a valuable guide and help to those seeking pleasure and profit to those seeking pleasure and profit from actual experience in the garden.

E. C. Vick.

AUDELS GARDENERS & GROWERS GUIDES

FULLY ILLUSTRATED — POCKET SIZE

GUIDE No. 1—*Soil Management*

Presenting a wealth of information for growers on working, fertilizing, irrigating and draining the soil, including valuable tables for field and garden requirements.

GUIDE No. 2—*Good Vegetables*

Giving successful cultural directions for growing each vegetable, arranged alphabetically, and including market gardening.

GUIDE No. 3—*Fine Fruit*

Giving successful cultural directions for growing each fruit, alphabetically arranged, including tree surgery and information on cash crops.

GUIDE No. 4—*Beautiful Flowers*

Giving successful directions for the cultivation and propagation of annuals, perennials, dahlias, roses, gladiolas and all other flowers, including shrubs and lawns

Dedication

Dedicated

To the Encouragement of all Growers

The Author

LIST OF CHAPTERS

Chapter *Page*

I Gardening for Profit.................. 1–8

II Preparation of the Soil................ 9–24

III Seed Selection and Planting........... 25–30

IV Succession, Double Cropping, Transplanting........................... 31–40

V The Use and Value of Glass (Hotbeds and Coldframes)..................... 41–60

VI Greenhouses........................ 61–70

VII Storing Vegetables—Experimenting.... 71–82

VIII Marketing, Cooperative Associations... 83–92

IX Cultural Directions (See list next page) 93–420

List of Chapters

Chapter *Page*

IX Cultural Directions—*(Continued)*

Artichokes............ 93–96
Asparagus............. 97–114
Beans..................114–134
Beets..................135–140
Broccoli...............140–141
Brussels Sprouts.......141–143
Cabbage................143–163
Carrots................164–170
Cauliflower............171–176
Celeriac...............176–178
Celery.................178–194
Chard..................195–196
Chicory................196–202
Chives—Collards........203–204
Corn...................205–215
Corn Salad.............215–216
Cress..................216–218
Cucumbers..............219–232
Dandelion—Dill.......... 233
Egg Plant..............234–238
Endive.................239–241
Garlic.................241–242
Horse Radish...........243–245
Kale...................246–250
Kohl-rabi..............250–252
Leek...................252–254
Lettuce................254–270
Martynia—Mint..........271–272
Muhsrooms..............273–279
Muskmelons.............280–294
Mustard................294–296
Okra...................296–298
Onions.................299–322
Parsley................323–324
Parsnip................325–328
Peas...................329–337
Peppers................337–342
Potatoes...............343–354
Pumpkin................365–366
Radish.................367–370
Rhubarb................371–374
Rutabaga...............375–376
Sage, Salsify..........376–378
Savory, Shallot........379–381
Spinach................381–386
Squash.................387–392
Sweet Potatoes.........355–364
Thyme.................. 392
Tomatoes...............393–407
Turnips................408–411
Watermelon—Citron......412–420

X Planting and Seed Tables.............. 421–435

INDEX

For Quick Reference in Answering Your Question or Problem.

A

Acid phosphate, 23
Advertising, 85.
Air drainage, 7.
Anthracnose, 120, 133, 228, 269.
Aphis, 266.
Apples, storing, 80, 81.
Arid sections, planting, 37.
Artichoke, 92–97.
Asparagus, 97–114.
Autumn plowing, 15.

B

Bacterial wilt, 227, 237, 392.
Beans, 114–134.
  intercropping, 32.
  sowing, 27.
Beetles, 113, 133, 227–229, 237, 238, 352.
Beets, 135–140.
  intercropping, 32.
  sowing, 27.
  storing, 78.
Borecole, 246–250.
Broccoli, 140, 141.
Brussels sprouts, 142, 143.
Bulbs, planting, 37.

C

Cabbage, 143–163.
  intercropping, 32.
  plowing and planting, 9, 51.
  storing, 71.
  transplanting, 35.
Cantaloupe, 281.
Capillary attraction, 25.
Carrots, 164–170.
  intercropping, 32.
  storing, 79.
Cauliflower, 171–176.
  intercropping, 32.
  planting, 51.
Celeriac, 176–178.
Celery, 178–194.
  intercropping, 32.
  marketing, 84.
  plowing for, 9.
  storing, 81.
Chard, 195, 379.
Chicory, 196–201.
Chives, ills., 202, 203.
Citron, ills., 418.
Cold frames, ills., 42–60.
Cole crops, 143, 148.
Collards, 203.
Commercial fertilizers, 356.
Compost, 20, 21, 59.
Cooperative associations, 83, 86–88.
Corn, ills., 204–215.
  intercropping, 32, 365.
  weeding, 17.
Corn salad, 215, 216.
Cover crops, 135, 142.
Cowpeas, 134, 336, 337.
Cress, 216, 217.
Crops, cover, 135, 142.
  deep rooted, 13.
  grains, 25.
  intercropping, 31, 32.
  leaf, plowing for, 9.
  profits on, 2, 3.
  succession, 31, 32.
Cucumber, 219–231.
  planting, 40.
Cultivation, 16.
Cultural directions, 93–420.

D

Dahlias, planting, 37.
  see Volume 4.
Dandelion, 233.
Dibbers or dibbles, ills., 35.
Dill, 232, 233.
Drag, ills., 13.
Drainage, air, 7.
  see Volume 1.

E

Egg plant, 233–238.
Endive, 239–241.
Evaporation checking, 25.

F

Farm selection, 6, 7.
Farm selection, map, 91.
Fertilizers, commercial, 22, 23, 26.
  formulas, 23.
  see Volume 1.
Flats, ills., 29.
Forcing boxes, 60.
Frost chart, 38, 39.
Fruit, marketing, 83–88.
  see Volume 3.

G

Gardening for profit, 1.
Garlic, 241, 242.
Gladiolus planting, 37.
    see Volume 4.
Glass, use of, 41.
Grass seed, tables, 422.
Green crop manure, 115, 120, 135, 142, 150, 346.
Greenhouse seedlings, 36.
    vegetables, 40.
Greenhouses, 61–70.
Greens, boiling, 247.
Growing season, map, 91.
Government inspection, 86.

H

Hardy plants, 27.
Harrows, various, 9–13, 25, 107, 137.
Harvest time, 53.
Herbs, 233, 376–380, 392.
Horseradish, 242–245.
Hotbeds, 43–60.

I

Inspection, government, 86.
Intercropping, 31.
Iris, planting, 37.
    see Volume 4.
Irrigation, 23.
    overhead, 135.
    see Volume 1.

K

Kale, 246–250.
Kohl-rabi, 250–252.

L

Leaf crops, plowing for, 9.
Leaf hopper, 352.
Leek, 252–254.
Lettuce, 254–269.
    cultivation, 13, 40, 51.
    intercropping, 32.
    plowed under, 5.

M

Maggots, 411.
Manure, green crop, 22.
Manure, various kinds, 20–22, 54.
Marker, ills., 34.
Marketing, 2–6, 30, 83.
Martynia, 270, 271.
Melon aphis, 230.
Melons, musk, 280–294.
    water, 412–420.
Mildew, 318.
Mint, 271.
Mosaic, 269, 352.
Mushrooms, 273–279.
Muskmelon, 280–294.
Mustard, 294–296.

N

Nitrogen and nitrates, 23.
    see Volume 1.
Nursery stock, 37.
    see Volume 3.

O

Okra, 296–298.
Onions, 299–322.
    intercropping, 32.
    storing, 71, 79.

P

Packing, 84, 85.
Parsley, 323, 324.
Parsnips, 325–328.
    planting, 13, 27.
    storing, 79.
Peas, 329–337.
    intercropping, 32.
    planting, 27.
Peppermint, 271.
Peppers, 337–342.
Pits, storage, 72, 77.
Plant protection, 41.
Plant setter, ills., 35.
Planting, hotbed, 51.
    large scale, 4.
    seed, 25–29, 139, 421–435.
    seedlings, 33–37.
    tables, 421–435.
Plow, 9.
Plowing, 9, 13, 15–17.
Potash, 23.
    see Volume 1.
Potato bug, 238.
Potatoes, 343–354.
    storing, 77.
    weeding, 17.
    sweet potatoes, 355–364.
Profits in gardening, 2.
Pumpkins, 365, 366.
    storing, 80.

R

Radish, 366–370.
    intercropping, 32, 139.
Rhizoctoniose, 352.
Rhubarb, 371–374.
Roads, 8.
Roller, 13.
Root cellars, 72.
Rust, 114, 134, 294.
Rutabaga, 375, 376.

S

Sage, 376, 377.
Salsify, 378.
    storing, 80.
Savory, 380.
Scab, 352.
Scallions, 315.
Sea kale, 250.
Seasoning herbs, 233, 376–380, 392.
Seed, amount estimating, 139, 152, 422, 423.
    conditions affecting, 13, 24, 25.
    inoculation, 333.
    selection and planting, 25–30.
    sowing in hotbed, 51.
    tables, 421–435.
    testing, 429.
Seed bed, 28, 29.
Setting rows, 26.
Shade, lath, 28.
Shallot, 381.
Shipping facilities, 8.
Soil, irrigation 8.
    preparation, 9–24.
    see Volume 1.
Sowing seed, 25–30.
    in hotbed, 51.
Soybeans, 134.
Spearmint, 271.
Spinach, 381.
    intercropping, 32.
Sprayer, ills., 89.
Spraying large fields, 250
Spring tooth harrow, 13.
Squash, 387–392.
    storing, 80.
    vine borer and bugs, 230, 231.
Storage rots, 364.
Storing vegetables, 71–82.
Subsoil plowing, 13.
Subsoiling, 9.
Successive crops, 32.
Summer squash, 389.
Sweet potatoes, 355–364.
    storing, 71, 80.
Swiss chard, ills., 379.

T

Thyme, 392.
Tip burn, 269.
Tomato, 393–408.
    intercropping, 32.
    transplating, 35.
Tools, 9–18.
Transplanting, 32–37.
Truck gardening, 1.
Turnips, 409–412.
    storing, 80.

V

Vegetables, cultural directions, 93–420.
    marketing, 83–88.
    planting tables, 421–435.
    rapid growth, advantage, 22.
    seed selection and planting, 25.
    storing, 71–82.
    under glass, 40–70.
    varieties studying, 81, 82
Vine crops, diseases, 227.

W

Water cress, 216.
Water supply 7.
Watering hotbeds, 52.
Watermelon, 412–420.
Weeding, 17, 18.
Wilt, 227, 237, 352, 392, 419.
Windbreaks 8, 149.
Wintered plants, 59.

Y

Yellows, 148.

Chapter I

GARDENING FOR PROFIT

Market Gardening is the intensive culture of crops on soil made very fertile, so the crops can be closely planted, carefully cultivated, irrigated as required, matured quickly and packed attractively, to yield good financial returns. This usually includes the use of considerable glass in cold frames or hotbeds or greenhouses, or all three.

Market gardens are usually located near cities and the location makes the land valuable. The cultivation is largely hand work.

Crops such as lettuce, radishes and celery are market gardening crops.

Truck Gardening is the growing of vegetables on a large scale. The crops are trucked to market or shipped by rail or boat. These crops usually consist of cabbage, celery, tomatoes, corn and other vegetables. The cultivation is by horse or tractor. Near Freehold, New Jersey, as an example, 3,000 acres of beans are grown on various farms for canners. In other sections tomatoes will be the main truck gardening crop, or it may be peas, sweet corn, spinach or sweet potatoes.

Quality.—More and more the demand is for superior quality in vegetables and fruits. Produce that reaches the market carefully graded and packed, of good size and color, particularly if shipped early will bring the highest price. Profits therefore depend largely on the quality produced. The yield of course must be fairly large.

Before deciding on the crop to be grown, study market conditions carefully. A variety popular in one place and leading in price, may not be the popular variety in another place.

Profits.—Profits vary greatly. Here and there is a man making so much that it can hardly be believed, but it is not advisable to expect to make the exceptionally high profits some are making, particularly so for beginners, as it is likely to lead to disappointment even when a really good start has been made.

At Great Meadows, New Jersey, as an example, there is a celery grower who has obtained from $1,200 to $3,600 per acre from growing a fine strain of large early celery. That figure represents his total sales. The cost of operating on a very liberal estimate, could not have exceeded $400 per acre, and was probably much less.

C. E. Willett of Concord Junction, Massachusetts, is credited with producing $3,000 worth of asparagus from three acres.

Two hundred dollars an acre is a satisfactory profit in truck gardening. Success, as in other occupations, depends largely on the operator.

Value of Various Truck Crops.—Nineteen truck crops produced in the United States in 1924 had a gross value to the growers of $313,000,000 according to figures given out by the United States Department of Agriculture. The acreage devoted to these crops was 2,302,000 acres, a 60 per cent increase over the acreage of 1921. The canning acreage has been more than doubled since 1921 and the acreage devoted to table vegetables increased one-third. The crops ranged in gross value as follows: tomatoes $55,000,000; early white potatoes $44,000,000; strawberries $35,000,000; muskmelons $20,000,000. Green peas, onions, lettuce, celery, cabbage and asparagus each came in the $15,000,000 to $17,000,000 range. Cucumbers, snap beans and watermelons ranged from $8,500,000 to $12,000,000 each; sweet corn for canning, spinach, peppers, cauliflower and carrots from $3,600,000 to $7,100,000 each; egg plant $1,030,000.

While gross return is far from being all profit, the truck and market gardening business is a far more reliable investment than mining or oil, both in the actual operation or in the stocks or bonds of mining or oil concerns. Crops sometimes may not bring as much as they cost to produce, but this does not happen very often with the wide awake grower.

From books and schools much valuable knowledge can be acquired, but actual experience will prove what is best for any particular soil, climate and location.

Likelihood of success in agriculture depends in a considerable measure on whether the farmer or gardener likes plants and working in the soil. If he does not, success is possible, but hardly likely.

Some women succeed as well as men in farming and gardening under favorable conditions. More women are constantly being employed in various branches of agriculture. In 1923 there were 1,084,128 women engaged in agriculture, forestry and animal husbandry in the United States.

Operating a farm successfully at long range, where the owner is not the actual worker or overseer can hardly be expected to be profitable. Recently a large seed establishment operating three good size farms, disposed of these properties, because the cost of the crops produced was considerably more than they could be procured for, under contract, with farmers who managed their own places.

The tendency now seems to be toward mass production; very large places where the work is done by power. The plowing, harrowing and cultivating, instead of three operations as formerly, is done in one operation by the use of a powerful tractor. The planting is largely done by horse power or tractor. Vegetable seed such as onions, beets, etc., instead of being planted with hand seed drills, each operated by a man, are planted by eight drills in a gang operated by one man and a horse. He will sow as much as twenty acres in a day, saving the labor of seven men and doing more work.

Markets.—The high cost of land near the markets of large cities makes it necessary, however, for large places to be a distance from the distributing points. Small places near markets have the advantage of getting the produce to market at a less cost, in shorter time, so it will be fresher and generally in better condition.

The largest cities do not always offer the greatest inducements to beginners. There are many towns all over the country that are good markets, for those able to work up the trade. In small towns better prices are often realized than in the large cities, as there is less competition. Small truck and garden places can be made very fertile. They can be closely planted and made more productive per acre than larger operations, so the small operator who works intelligently should be able to make money. Green stuff is very perishable and easily damaged by rough handling. The nearer the market the less will be the cost of packing.

Roadside markets offer the grower an opportunity to dispose of his products at practically city market prices. Where automobile travel is heavy, a roadside market frequently sells, during the season, $300 worth of produce in a single day.

Roadside markets in some places block traffic with the parked cars about the stand and there will likely be regulations, requiring cars to park on the owner's property and off the road.

There are some roadside markets that purchase all the produce they sell. Some of it comes from long distances and is far from fresh. Purchasers are naturally disappointed when they find they have taken the trouble to carry home from a distance, stale food which they could have obtained at home, instead of fresh country produce which they had a right to expect.

Where strictly home grown products are offered, this should be made plain on signs and lived up to. Sharp practices are likely to lead to licensing these stands, the license to be kept in sight of purchasers, stating whether the seller is the grower or simply a merchant who buys and sells produce.

Making a Start at Market Gardening.—Where it is a question of whether or not gardening will prove profitable, working men can, in connection with their regular business, devote an acre or two to growing crops, the management of which is least complicated. By keeping a strict account of expenses and receipts the probable return from each crop can be calculated.

Three or four years may be necessary to fully decide the matter, because the land can only be brought into condition for best results after several years of manuring and working.

Some seasons the price of any crop may be very low and the next high. A large grower of lettuce in New York State one season plowed under as beautiful a crop of lettuce on a thirty-acre field as one is ever likely to see. The price was too low to pay to pack and send it to market. It was early. The land was immediately planted to lettuce again and the second crop brought sufficient to pay a good profit on the season's work. One year's results must be averaged with another.

If the experiment is successful, more land may be added and other crops grown. The use of cold frames, hot beds and greenhouses is a stage that may be finally reached.

The experimental plan is not necessary, but it is safe. A case is known in which several men are now comfortably off financially, but none of them had very much knowledge of gardening when he started. Each was an active working man and depended on his own efforts for success. Some go right in and succeed. Strength, determination and a willingness to learn, go a long way toward success. Dependability—honesty—is also an important factor. A good rule is to never plant more land than can be taken care of in a thorough manner.

Selecting the Land.—For general farming, light soil underlaid with light soil or gravel is not recommended, but this may not apply to gardening.

Good deep loam is to be desired and if somewhat sandy, it will be much less troublesome than heavy clay. For a variety of crops, the land should be varied in character, otherwise the grower should confine himself to such crops as are particularly adapted to the land and location.

Low lands which require under draining are adapted only to special crops and require quite heavy outlays to put them in shape for cultivation.

Preferable to heavy clay or low lands is a sandy loam with a sandy or gravelly subsoil. Soil of this type is better than soil with a clay subsoil, because it is well drained and warmer. A clay subsoil may require under draining. Water must descend in wet weather and ascend in dry weather.

Avoid land on which water may stand and rocky or stony land.

Lay of the Land.—The land should be level or have a gentle eastern or southern exposure. Two crops a year can be grown on a southern exposure where only one can be produced on a northern exposure, owing to difference in the earliness in which the land can be worked in the spring.

Lands on a retentive subsoil, such as clay, by careful handling and liberal expenditure in under draining, can be made to produce excellent results. Almost any soil by proper drainage, fertilizing and irrigation can be made highly productive, but this takes time, labor and money.

Air Drainage.—Good air drainage is often important to prevent damage from frost. Gentle slopes secure such drainage. Land on a hill top may be free from frost at a time when frost will damage crops at the bottom of the hill or in the valley. The cold air being heavier than warm, drains down, while the warm air rises. Obstructions, such as woods or ridges of land, check the movement of both the cold and warm air, increasing the tendency to frosts. A cultivated hill top may be subject to frosts because the movement of the air is obstructed by a piece of woods below it. Gentle slopes are also likely to have good soil drainage. Steep hills are undesirable. They increase the cost of operating, are not retentive of moisture and are subject to erosion. Winds are less severe on southern slopes.

Water Supply.—A cheap and abundant supply of pure water should be available. Irrigation is necessary at times. Water is constantly needed for hotbeds, coldframes and greenhouses, also to clean vegetables and to supply any livestock that may be kept.

Windbreaks.—Every experienced fruit and vegetable grower knows the value of windbreaks. Rows of trees are closely planted to break the wind. Hedges are artistic and high fences of solid boards or gunny sacks are sometimes used.

Roads.—Locate on a good road. A hard, smooth road is important in getting to market or for others to get to the garden.

Shipping Facilities.—At distances from a market, shipping facilities should be carefully considered. More than one line of transportation is an advantage. Produce should be moved to market as soon as loaded. For large shipments or long distances, ice will be required.

Chapter II

PREPARATION OF THE SOIL

Proper preparation of the soil, previous to sowing or planting, is one of the most important operations in producing a crop.

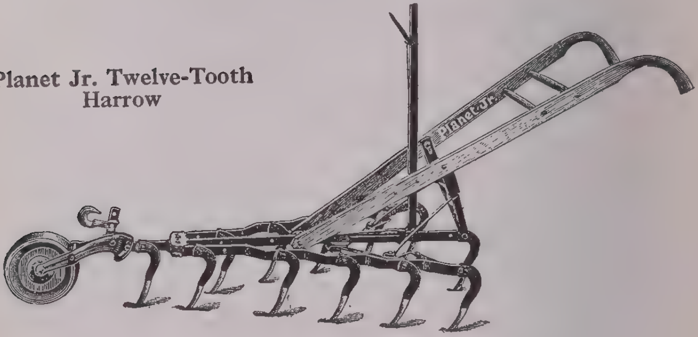
Plowing, subsoiling, harrowing, raking and manuring are required to put the land in condition for another crop, after one has been produced. Subsoiling is not now generally practiced and its utility is questioned by some, while other gardeners recommend it for some crops.

GENERAL PURPOSE PLOW

One of the most successful market gardeners in the East recommends that the land be plowed once before an application of manure is made. For leaf crops like cabbage, celery, etc., eight inches is the depth of the first plowing. The second plowing which turns under the manure is only six inches deep. This covers the manure but leaves it near the surface. The plowing is followed by a disk harrow for breaking up the lumps,

VARIOUS TYPES OF HARROWS

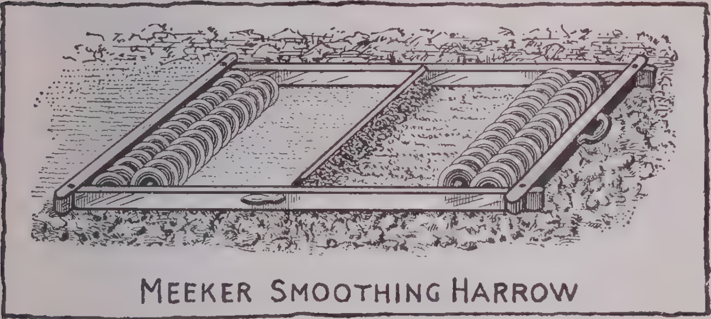
Planet Jr. Twelve-Tooth Harrow



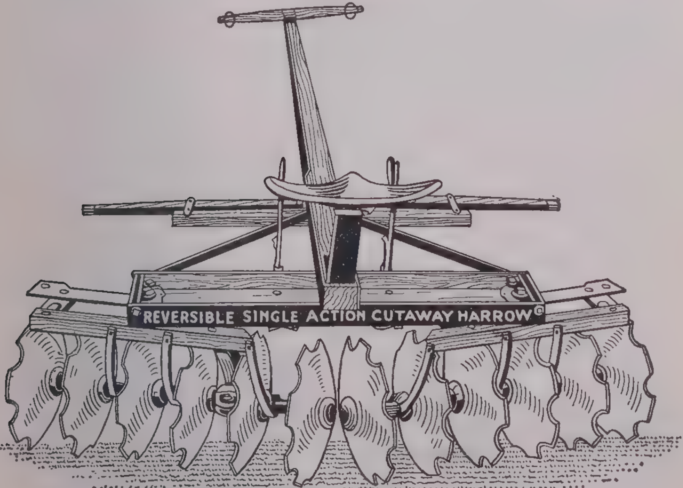
Plowed land should be harrowed the day it is plowed

The spring tooth harrow brings to the surface the lumps that escaped the disk harrow

VARIOUS TYPES OF HARROWS

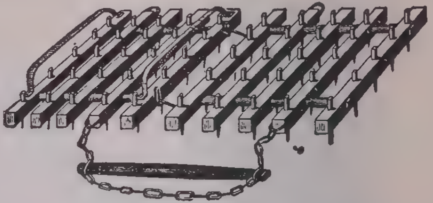


Plowing is followed by harrowing to break up the lumps

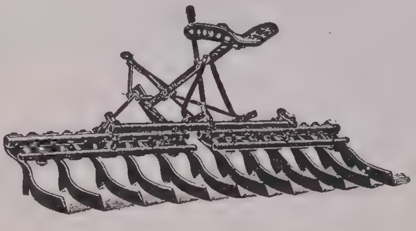

"REVERSIBLE SINGLE ACTION CUTAWAY HARROW"

Disk Harrow

The soil cannot be made too fine and even

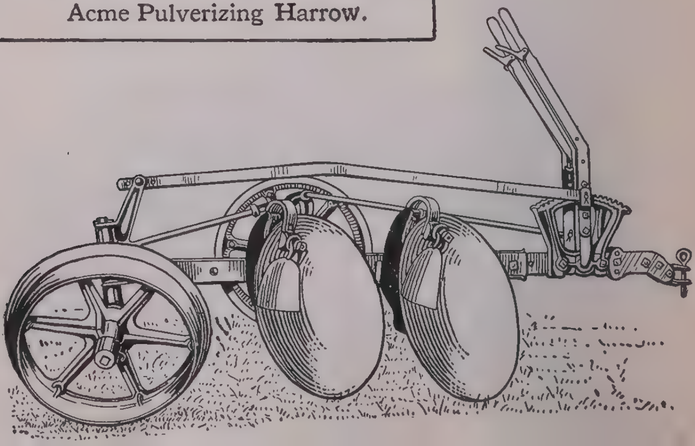


Hinge Harrow with Runners.

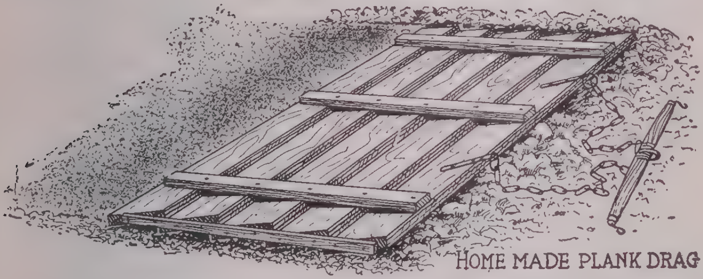


Acme Pulverizing Harrow.

Oliver Disk Harrow for use with Tractor



after which it is gone over with a harrow or dragged with a plank drag which can be made at home.



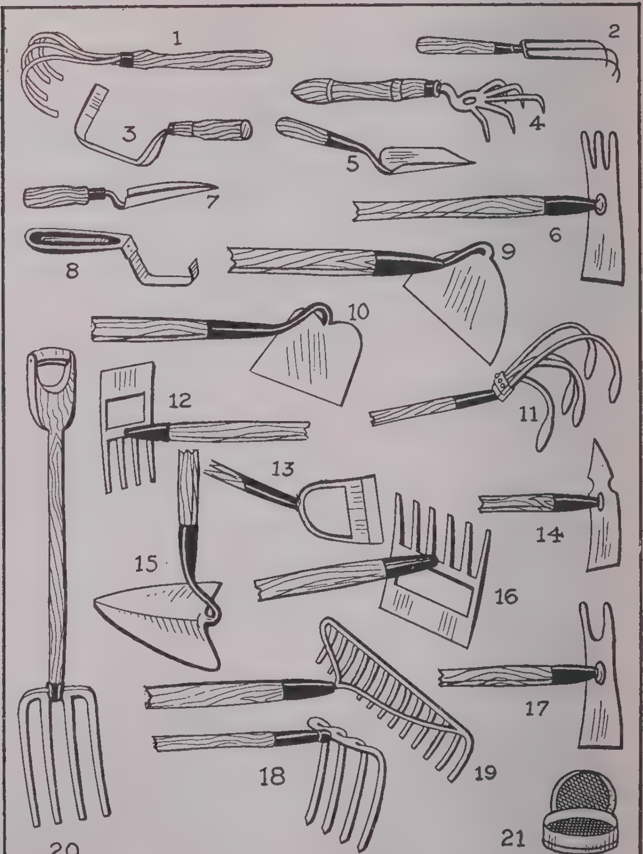
THE WEIGHT OF THE DRIVER HOLDS THE DRAG DOWN
A bag of dirt on either side is frequently used also to weight down the drag

The soil cannot be made too fine and even. Seeds will not catch evenly or grow well unless the soil is fine; plants will not mature together and will lack uniformity in coarse soil.

For fine seeds such as lettuce it will be necessary, in addition to the above, to use a hand rake or some similar implement to make the soil as fine as possible.

For deep rooted crops like carrots, parsnips, etc., the first plowing should be twelve inches deep, followed by a subsoil plow in the same furrow, going down to a depth of sixteen to eighteen inches. The second plowing to be eight inches deep.

The spring tooth harrow is good for following the disk as it brings to the surface the lumps not yet broken. The roller will crush the unbroken lumps, if that is necessary, after which the land may need light cultivation, with a spike tooth harrow or similar tool to loosen up the surface again, before seeding.



TOOLS USED IN PREPARATION OF SOIL
(See description on opposite page)

Autumn plowing is the general rule with vegetable growers, particularly on heavy soils. If the land is left in ridges the frost operates on it favorably during winter. Vegetable matter plowed under in the autumn becomes better decayed and more valuable for the spring crop. The land, in some cases, is harrowed and planted early in the spring. Late plowing in the autumn exposes insects which are killed by the weather. In the case of sod land to be prepared, earlier autumn plowing will hasten decay and put it in better shape for the crop to be started in the spring.

In the South, autumn plowing may lead to leaching and cover crops should be used.

When plowing is done in the spring it should be done at the earliest date possible, but not until the ground is sufficiently dry.

Deep plowing is now general with market gardeners, but plowing must be deepened gradually so as not to intermingle a large proportion of unproductive subsoil with the productive topsoil.

NAMES OF TOOLS ILLUSTRATED ON OPPOSITE PAGE

1. Yoder's Hand Weeder
2. Eureka Hand Weeder
3. Hazeltine Hand Weeder
4. Excelsior Hand Weeder
5. Steel Shank Trowel
6. Three Point Garden Hoe
7. English Steel Trowel
8. Lang's Hand Weeder
9. Half Moon Hoe
10. Square Blade Hoe
11. Norcross Garden Cultivator
12. Weeding Hoe and Rake
13. Scuffle Hoe
14. One Point Garden Hoe
15. Warren Hoe
16. Combination Rake and Hoe
17. Two Point Garden Hoe
18. Potato Hoe or Manure Drag
19. Steel Bow Garden Rake
20. Garden or Spading Fork
21. Soil Sieve

Thoroughness in tillage is necessary to success, as well as promptness. Plow, cultivate and weed at the earliest opportune time. Often plowing can be done for a day or two and after that rain may make the soil so wet that the operation will be long delayed. Delaying the planting may carry the maturity of the crop past the time when best prices can be obtained for it. Letting the weeds get a start may add greatly to the labor and expense of weeding and sometimes ruins the crop.

Disking is sometimes done before plowing. If manure has been applied it is cut by the disk so that it decays more quickly and the soil is turned over in fine condition by the plow. The harrowing after plowing completes the work resulting in a well prepared bed of fine soil.

Plowed land should be harrowed the day it is plowed and not left for the moisture to escape and the soil to dry out.

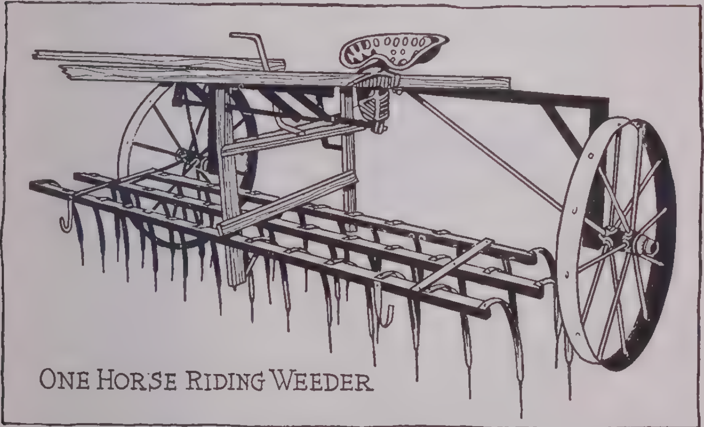
Cultivation.—There are hand cultivators, made to operate between closely planted rows, in good soil; and horse cultivators operated when riding or walking. These are also used with tractors.

In working garden crops such as sweet corn, beans, cabbage and tomatoes, two-horse riding cultivators are employed. One-horse cultivators are also extensively used.

Narrow shovels and the spike tooth on cultivators fine the soil well and conserve soil moisture. Broad shovels are used in destroying large weeds and breaking up hard soil.

Hand wheel cultivators are made to straddle the row and others to work only between the rows. Double wheel hoes are preferred in good, level soil. The single wheel hoe is better for soil that is more difficult to work. A variety of attachments are made for wheel hoes and seed drill attachments can be obtained for some makes.

Cultivate as soon as the land is sufficiently dry after every rain, never permitting hard crusts to form on the surface, until the plants are so large as to make cultivating difficult or impossible.



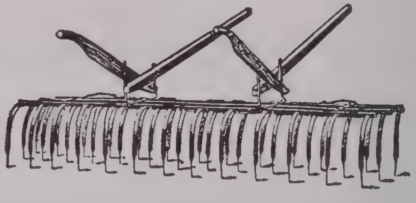
USEFUL IN WEEDING SOME CROPS SUCH AS CORN AND POTATOES

Cultivating should begin as soon as possible after sowing the seed or setting out the plants. Cultivate deeply at first, decreasing the depth as the crop develops. Work close to the rows, so as to break up the crust between the plants.

The horse cultivator or wheel hoe may require supplementary work with hand hoes.

Where a tractor is used, rows are planted so the wheels of the tractor will work in between the rows, the tractor straddling the row.

Weeding.—Horse weeders are used in weeding some crops such as corn and potatoes, where the soil is light and easily worked. These can be used for a while after planting to keep the weeds down.



"Hallock" Pattern Field Weeder and Cultivator.

USEFUL WHERE THE SOIL IS LIGHT AND EASILY WORKED
Supplementary weeding between the rows may be necessary

In closely planted crops, especially onions and also to some extent in beets, carrots and some others, hand weeding is necessary and a number of small tools are made for this purpose.

Care of Tools.—When through using a tool put it in its place. Have a place for every tool. This will reduce the item of tool expense very considerably and it saves time knowing exactly where to find a tool when wanted. This saving during a whole year will be more than one can realize. Keep the tools clean and under cover in a dry place. Keep them pointed and in repair and cutting tools sharp.

Hand hoes, when used, need sharpening frequently. A heavy file will put a good cutting edge on a hoe.

Labor.—Vegetable growing requires long hours at certain seasons, but the compensation is proportionate, under proper conditions. Men cannot do good, hard physical work for more than ten hours and as far as possible the working time should be governed accordingly. Marketing by motor truck or wagon often requires a very early start in the morning, or possibly the night before to make a very early or distant market.

In intensive market gardening one man can be profitably employed to the acre. A ten acre market garden in New Jersey employs 16 men during the season. In other cases one man cares for several acres, depending on the crops grown and the system of marketing.

Arrange the work as far as possible to keep the good workers constantly employed. This permits training them so less supervision of their work is required and they become more valuable and dependable.

Capital.—The capital required to equip and operate a vegetable garden is considerably more per acre than for farming. Market gardening requires more capital per acre than truck gardening.

The amount of capital will depend on many things—fertility of the soil—the amount of glass to be operated—crops to be grown—distance from market—water supply and other factors.

Henderson suggested $300 per acre for a 10-acre place, but that was long ago and the cost is greater now. Rawson sets the figure at $500 per acre, but his operations were largely under glass. The figures given by market gardeners vary, according to location, from $100 in Illinois and Virginia, $75 in Texas to $200 to $300 in other places.

Stable Manures.—Fertilizers and green manures are fully treated in the first volume of this set. Without fertilizers used liberally and intelligently, it will be useless to attempt to make money through growing crops of any kind.

Cow manure is a slow acting but valuable manure. It decomposes much slower than horse manure. Cow manure is often obtainable where horse manure cannot be had.

Hog manure is also slow in action. It generates little heat in decomposing. It is a good fertilizer for vegetables.

Sheep manure decomposes rapidly and creates considerable heat. It is sold generally by seedsmen and used in large quantities on greenhouse and hot bed crops and also in the field.

Hen manure is especially valuable and is often less difficult to obtain than any other. It is strong and hot and should be mixed with earth or other material before using on crops.

Horse manure is the manure used exclusively in making hotbeds for supplying the necessary heat, and this must be fresh manure, containing new straw.

For crops that are to be matured quickly, only well rotted manure should be used in the soil. This is because rotted manure is available for plant food, while fresh manure must decompose before it can be used by plants. Rotted manure however will not generate heat as fresh manure will. Therefore fresh manure is required under hotbeds to furnish heat, while rotted manure should be used in the soil in which the crops are to grow in the hotbeds.

If manure is composted, additional benefit will be derived for use as soil for hotbeds or seed beds. This is accomplished by first placing a layer of good soil, then a layer of manure (fresh manure will do) and so on, building up a square, flat pile, in tiers of this kind from four to six feet high, each tier being a foot deep.

It will take six months for the manure to become well rotted. After two months, turn the pile over and again two months later. Turn it once anyway. This will mix and help break the material and make it fine. Some market gardeners use a power compost pulverizer, running the material through the pulverizer before spreading it evenly over the beds.

Fresh manure is not quick enough in its action in the soil for market gardening purposes, besides, it causes rank growth in tomato, cucumber, melons, pepper and others, with diminished production of fruit. On land where parsnips are to be grown, fresh manure will cause divided and badly shaped roots and it prevents proper root development in other root crops such as carrot, beet, turnip and radish.

Manure should not be used directly on land where root crops are to be grown. Heavily manure the preceding crop of the year before and then follow with a root crop without manure.

Quantity to Apply.—The quantity of manure to apply depends on the supply, the kind of crop and the character of the soil. In intensive gardening manure may be spread four inches deep evenly over the whole surface. Three inches is a liberal application. Green manures, commercial fertilizers and irrigation are the substitutes where manure is not obtainable.

Coarse manures are plowed under. Fine manures should be used as a top dressing after plowing. Where large quantities of manure are to be spread over acreage, manure spreaders save labor and give an even distribution.

Night Soil was used to a considerable extent before the advent of general sewage systems. In Rochester, New York, it was used by nurserymen and florists until about 1880. Near Philadelphia and Baltimore it is still used, or was until quite recently, being transported in tank wagons or in barrels with tight covers. The material is obtained at no cost. In a New Jersey town where cesspools are used, the town pays a contractor for handling this material. He operates a market garden and not only gets his fertilizer for nothing, but is paid for using it. In Europe night soil is quite generally used.

Green Manures must be relied upon, more and more, as stable manure becomes scarcer. Potatoes have been grown for years in New Jersey on the same land, depending for humus on green crops, sown as soon as the potato crop is harvested. Clover, rye and cowpeas are used. Beans are grown, year after year, on the same land, plowing under the vines after the pods are picked. Commercial fertilizers are used to supplement the green manure.

Commercial Fertilizers.—Stable manure is rich in nitrogen and where it is used, it should be supplemented with phosphoric acid and potash. Early crops are important to market gardeners, as generally they bring the high prices. Commercial fertilizer of good quality is immediately available and gives the plants a quick start, maturing the first crop early, getting it to market and clearing the land for a second and possibly a third crop. Sometimes the later crops will bring more money than the first.

Another advantage of rapid growth is that the quality of the vegetables is likely to be better in flavor and texture. Slow grown radishes will be hot and tough and possibly hollow. Vigorous plants better resist the attacks of insects and disease.

Commercial fertilizers should be used after plowing, working in lightly in the top soil.

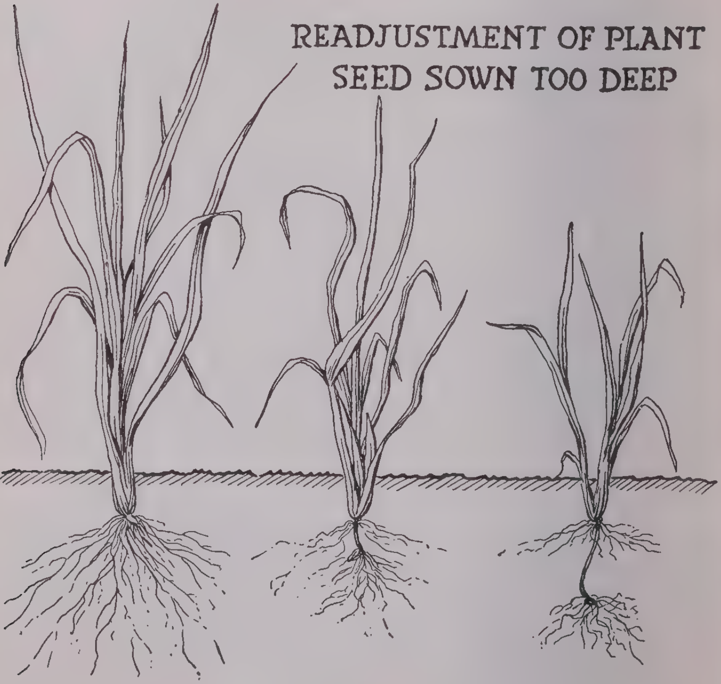
A quick acting nitrate nitrogen is of great benefit in starting crops. The best results are obtained from moderate amounts applied frequently, rather than one heavy application. In the early spring, when the soil is cold it will give results when nothing else will.

Nitrate of soda was formerly used almost exclusively for this purpose. It contains about 16 per cent nitrogen. A newer material, called leunasalpeter is now quite generally used, containing 26 per cent nitrogen. This material keeps the soil moist and plants respond to its use quite remarkably.

Acid phosphate is also important; also, potash. Lime will be needed from time to time, according to the character of the soil, the kind and quantity of fertilizer used and the crops grown.

Fertilizer formulas are given in figures thus, 5-8-8. The figures denote the percentage of the three important fertilizing elements. The first figure represents the percentage of nitrogen, the second acid phosphate and the third potash. The label should indicate whether the nitrogen is immediately available or not. In the South potash may be represented by the first figure, acid phosphate by the second, nitrogen by the last.

Irrigation.—Plants cannot develop and thrive without water. No matter how great the quantity of plant food in the soil, water alone permits plants to utilize it. Plants are largely composed of water and in addition it is necessary for them to transpire large quantities of water through the foliage. Uniformly successful starting of seeds and transplanting is not possible without a good supply of moisture. Water insures better quality, larger yields and earlier maturity.



Chapter III

SEED SELECTION AND PLANTING

Selecting Seed.—The cost of preparing the land, the cost of fertilizer and finally the importance of an abundant crop of fine quality should all be considered when ready to purchase seed. So much depends on good seed, that the aim should be to secure the very best seed possible, regardless of price. The seed should be fresh, clean, pure, not mixed, to produce the best type of the variety. Strains of the same variety may differ widely in the crop produced. The viability should be good insuring good germination. Make seed purchases early, before the supply has been drawn on.

Seed Planting.—Congenial temperature and a continuous supply of moisture are necessary to insure germination. The soil must be granular and loose. When the soil is likely to become dry, the earth should be firmed over the seed. For grains, a roller is used. Seed drills are fitted with a roller behind the delivery spout. When sown by hand the earth is pressed with the foot or hoe. This insures good capillary attraction, which soon afterwards should be broken on the surface by going over it with a rake or smoothing harrow, to prevent evaporation. Keep the space between the rows well tilled, not waiting for the seed to germinate.

The rows in small plantings should be set with a line and be absolutely straight. Nothing is more distressing to a good gardener than crooked rows. A check rower is sometimes used and some gardeners are quite expert in planting straight rows with a horse or tractor, by setting up stakes at each end of a row, and sometimes with a stake in the center between the two end stakes when the rows are long. Sighting on the stakes in front of him enables the planter to keep the rows straight.

Seeds which germinate slowly and where the seedlings are delicate, should be sown thickly to insure the plants breaking through the crust on the surface.

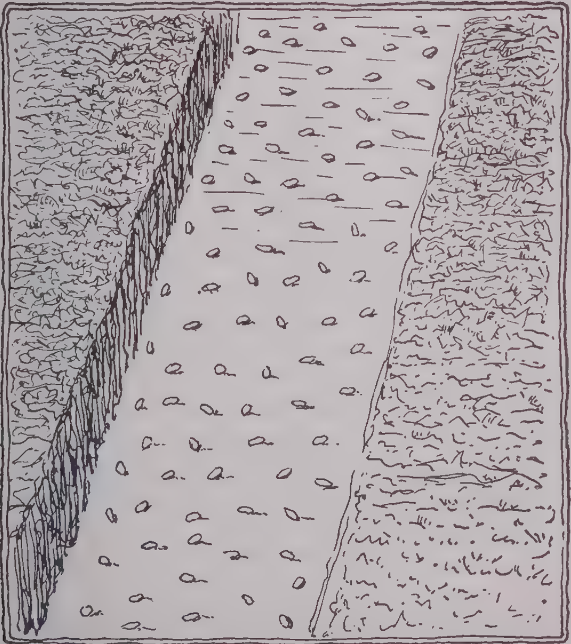
Strong, quick germinating seeds may be sown with slow germinating kinds, to break the soil and mark the row, so tillage may keep down the weeds. Radish, cabbage or turnips can be sown in the rows with parsnips, carrots or celery. A crop of radish may be obtained in this way before the main crop is ready to use the land, but the object is to insure the main crop breaking through. The cost of the extra seed required for thick seeding should be considered as crop insurance.

Commercial fertilizer should not come in direct contact with seeds. Ordinary quantities sown broadcast will be harmless.

The depth at which seeds are to be planted depends on the size of the seeds; on the character of the soil, whether heavy or light; whether soil is dry or moist, and on the season.

Seeds that may be sown shallow in fine, moist soil will require deeper planting in dry soil. The finer the seeds the shallower they should be planted. Covering the seeds twice their diameter is the usual rule, which will properly apply in small beds, very carefully prepared or in boxes, but for large plantings in the open ground somewhat deeper planting will be required.

Seeds having thick husks or shells, such as beets, beans, parsnips and peas, require deeper sowing than finer seeds, as more moisture is required to start germination.



SEED SCATTERED IN WIDE ROW

Hardy and half-hardy are terms used rather indiscriminately regarding plants. Hardy means those able to withstand the climate of a stated location. Half-hardy means those able to stand some of the vicissitudes of the climate, while those considered tender are unable to stand frost. The English ivy, for example, is hardy at Elizabeth, New Jersey, living in the open ground and surviving the winter.

Seeds of hardy plants may be sown in the spring as early as the land can be prepared and are sometimes sown in the autumn. Onion and leek are examples, but even these are best sown in the early spring.

Seeds of half-hardy plants may be sown from one to three weeks before settled weather.

Tender seeds such as beans and cucumbers may be safely sown after the last frost and when the ground is warm. Tomatoes, egg plant and other plants which are generally transplanted, are started from seeds in a greenhouse or hotbed. Here the conditions can be kept under uniform control and the germination of the seed will be better and the plants will grow faster.

A seed bed may be found useful. It should be made in a small space, of the very best soil, in a convenient place. A cold frame is frequently used for this purpose. Care must be taken not to keep the bed too wet or the plants will damp off. The plants must have light and air.

A lath shade may be required above the plants to protect them from direct rays of the sun when it is very hot.

Two laths are laid upon the floor, parallel to each other and just the length of a lath apart. Another lath is laid diagonally from the end of one of these laths to the end of the other. On these are laid laths about half an inch apart, across the full length of the two parallel laths. The two parallel laths and the diagonal lath are covered with others on the upper side of the laths laid across the frame. A small nail is driven through each lath, on the two parallel laths and the diagonal laths, which will make a light, serviceable shade for hot beds or cold frames and which is frequently useful in shading parts of the greenhouse.

THE SEED BED SHOULD BE MADE OF THE VERY BEST SOIL

It is better, when possible, to put seed in freshly prepared soil and to sow immediately after a rain rather than just before. A crust forms on the surface after a rain, which shuts out the air and prevents germination. When rain falls immediately after seed sowing, go over the bed with a rake and break the crust. This may make a full crop whereas if a crust is permitted to remain over the seed, only half a crop will result.

READY CASH FOR DAILY NEEDS

Roadside markets catering to passing automobiles bring the full price for farm products and are a steady source of income for many growers

Chapter IV

SUCCESSION, DOUBLE CROPPING, TRANSPLANTING

Succession and Double or Companion Cropping.—The successful gardener plans to have no waste of land or time. Crops are planned to occupy all the land and follow each other in quick succession. In the North lettuce plants are set out early and mature in about five weeks. Radishes are planted between the lettuce rows and grow with the lettuce crop. Soon a third crop follows, possibly beans, and these may be followed by another crop and certainly by a cover crop. One crop following another closely is called a succession crop.

Intercropping.—When two or more crops are grown together it is called intercropping, double cropping or companion cropping. Sometimes cabbage, lettuce and radish are started at the same time in the early spring, in three separate rows. Radishes mature and are removed very soon after planting. These are followed by the lettuce, which will be followed by the cabbage and still another crop such as turnips or beans may follow the cabbage.

Intercropping can be practiced on comparatively small acreage where it may be impractical on large places, because on large areas the work of cultivating is likely to be done by horse or tractor power which does not permit of close planting. Close intercropping requires hand labor, hoes and wheel hoes in weeding and cultivating. It requires more liberal use of fertilizer and soil moisture. On the other hand the succeeding crops make use of the fertilizer applied for the first crop and several crops are produced with one preparation of the land.

It is easier to watch and direct laborers on a small plot of land, than when spread out over broad fields.

In intercropping, as far as possible, the crops should be of different botanical families, so as not to leave the soil unbalanced or to encourage the same kinds of fungi and insects.

Examples of intercropping are: Radishes with carrots or beets, the radishes being the first to develop. Lettuce with radishes or early cabbage. Early cabbage with horse radish. Corn with squash or beans in hills. Early onions, with cabbage or cauliflower. Early cabbage, lettuce and radish. Peas and radish. Onions and celery. Tomatoes and spinach. Spinach is sown early in rows a foot apart. Set tomatoes in every fifth row, three feet apart.

For successive crops, the early crop often consists of beans, beet, cabbage, carrot, cauliflower, kohlrabi, lettuce, onion sets, parsley, pea, potato, radish, spinach or turnip and the late crop of beans, beets, Brussels sprouts, cabbage, carrot, cauliflower, celery, corn, cucumber, egg plant, horse radish, leek, muskmelon, okra, onion, parsnip, pepper, potato, pumpkin, salsify, spinach, sweet potato, tomato, turnip or watermelon. This list is offered merely in the way of suggestion. Many other combinations may be worked out for succession or intercropping.

Transplanting.—There are various reasons for transplanting. Plants can be started much earlier in hotbeds or greenhouses, transplanting the seedlings so they will have more room for root and leaf development, where they will make good sized plants for setting out in the open when the weather is favorable.

Ideal conditions can be produced under artificial heat and proper moisture supplied; the loss is small with delicate plants. The seedlings are confined to a small space where they can be more economically weeded and cared for than in an open field.

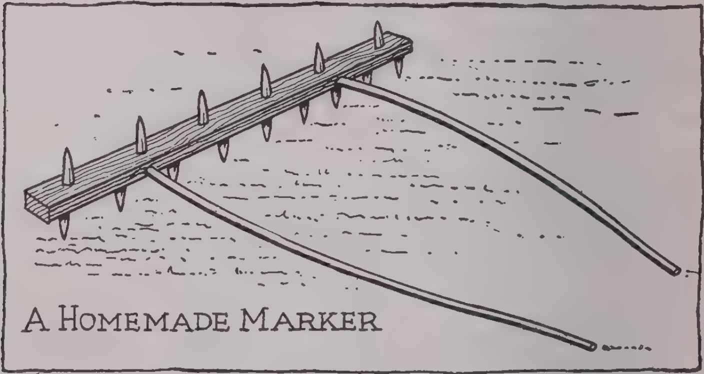
How to Transplant.—Before transplanting seedlings, water the soil well in which they are growing and after permitting the water to drain, lift the plants carefully with as much soil as possible adhering to the roots. Water as soon as the plants are set out.

Plants having few fibrous roots are difficult to transplant, such as muskmelon, watermelon, squash, corn, bean, beet, radish, turnip, etc. These may safely be transplanted if started in small pots so they can be shifted without disturbing the roots.

The soil into which the plants are transplanted should be as carefully prepared as for a seed bed and the soil must be kept damp, until the plants become established.

In transplanting be sure that the plants are large and strong and have been hardened off by proper ventilation and reduced temperature. Do not set out until the weather is favorable. Transplant, if possible, just before or just after a rain and anyway in cloudy weather. If the plants must be set in hot, dry weather, plant in the late afternoon and evening. Some plants like lettuce started in cold frames can be hardened off by gradual exposure, until they will stand a light frost without injury. Others like tomatoes removed from a warm atmosphere will be set back badly by severe cold even if there is no frost.

Have every row straight, not only for appearance sake, but for economy in weeding and cultivating. Keep the plants out of the sun and wet until planted.



(See description below)

Home made markers are not difficult to make. Holes are bored in the crossbar and the pegs set at whatever distance apart it is desired to have the rows.

In using the markers, stretch a line along one side of the plot to be planted. Set the marker at one end of the line, with the side tooth at the line. Walk backward in drawing the marker, to see that it follows the line closely. This will mark several rows, according to the width apart. Move the line over and reset, marking off the whole plot in the same way.

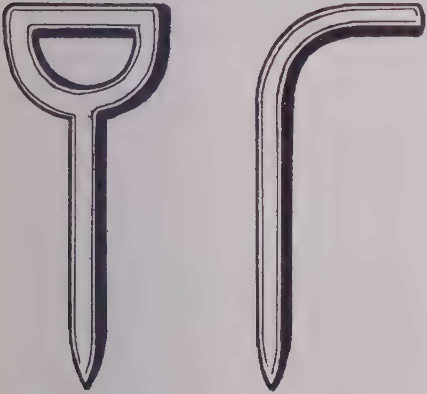
On hilly land, always run the rows with the hill, not up and down. Begin the marking at the top of the hill.

Depth to Plant.—Set the plants slightly deeper than they stood in the seed bed. Spindly plants should be set deep, but it is better not to grow spindly plants. Spindly plants indicate too much heat, not enough air or crowding of the seedlings.

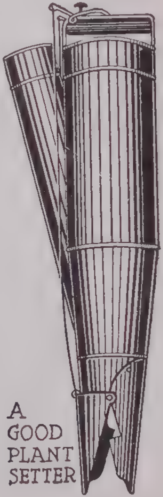
Tomato plants especially should be set rather deeply, particularly spindly plants.

Autumn set cabbage plants in the South are set up to their leaves to enable them to withstand the winter.

DIBBERS OR DIBBLES



Dibbers for greenhouse or hotbed work may be whittled out of small sticks. There are also several very good setting devices made of metal on the market

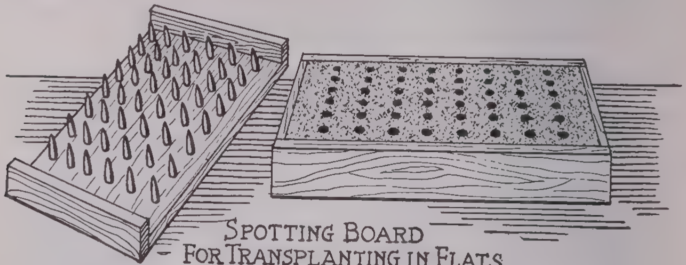


A GOOD PLANT SETTER

Various forms of dibbers are used in transplanting. These can be bought of seedsmen or made at home. In heavy soils, trowels are used. The soil should be pressed firmly about the roots of the plant when it is set. For hotbed and greenhouse work, dibbers are whittled out of small sticks.

A very good plant setter is made for setting cabbage and tomato plants and the like. It applies water as the plants are set. It will be found advertised in most seed catalogues. Five thousand plants is about an average day's work, transplanting by hand.

Planting Greenhouse Seedlings.—In greenhouses, where seedlings are grown in flat, shallow boxes, about 3 inches deep and 15x20 or 18x24 inches, made from cut down soap boxes, holding about 100 seedlings, a frame is made the exact size of the surface of the box. In this holes are bored with a ¾-inch bit, at equal distances apart in straight rows. This is set over a box of soil and all the holes punched with a small wooden dibber. The plants are then set in the holes. Another board can be made with pegs set to fill each hole, so all the holes may be made with one operation.

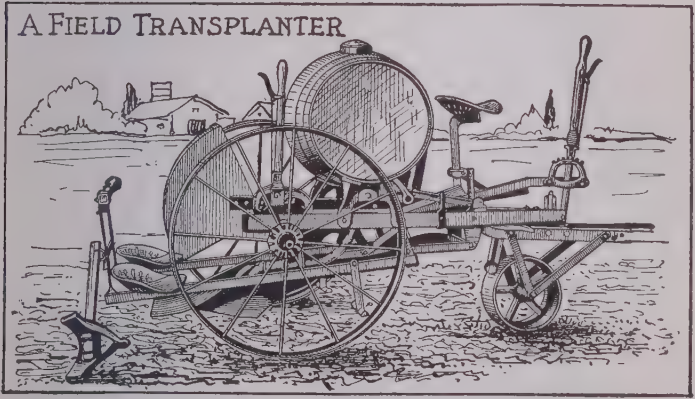


SPOTTING BOARD
FOR TRANSPLANTING IN FLATS
EASILY MADE FROM CUT-DOWN SOAP BOXES

Clipping the top of plants may be a benefit before transplanting.

In large plantings, if the soil is fairly heavy, a light shovel plow is employed to make furrows, which are made only as fast as needed. The plants are dropped in the furrows by boys, and other boys following closely set, cover and firm the plants.

Transplanting machines were first used in Rochester, N. Y., in setting out aster plants. They have been greatly improved and are now in general use. Three men operate the machines, a driver and two planters who ride behind. The machine opens a furrow and drops water. The men drop the plants and the machine covers them It is well to have a boy follow and see that each plant is properly set, resetting any requiring it. A machine of this kind will set ten acres a day.

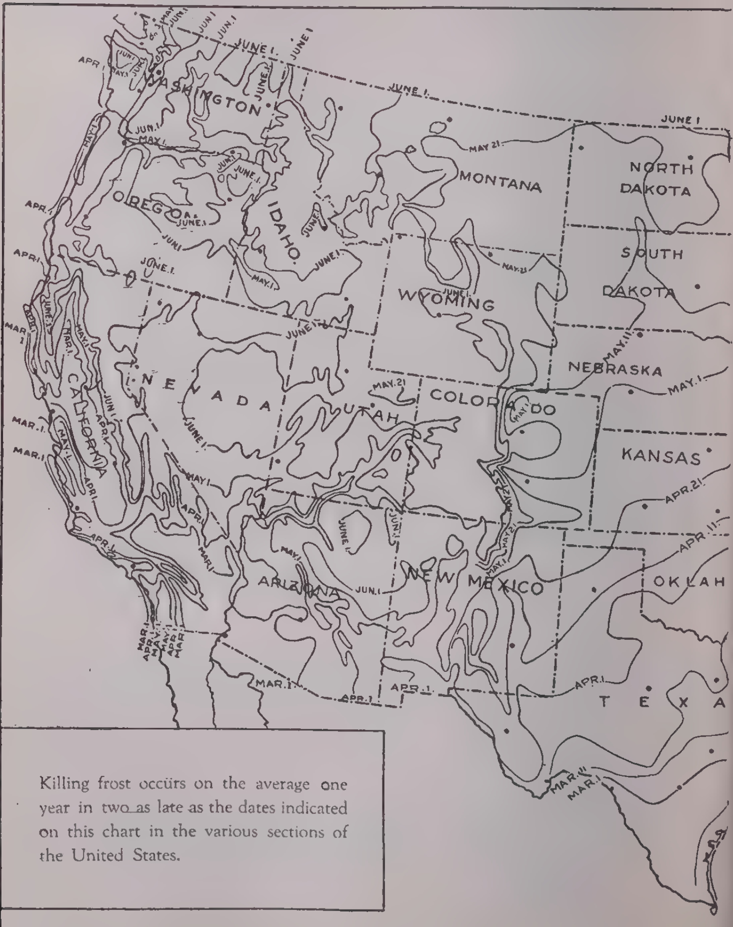


HOME MADE FIELD TRANSPLANTER

Nursery stock, dahlias, gladiolus, iris and other plants are now planted with these machines. The transplanting machine can be used when the earth is too dry and too hard for hand work on a large scale.

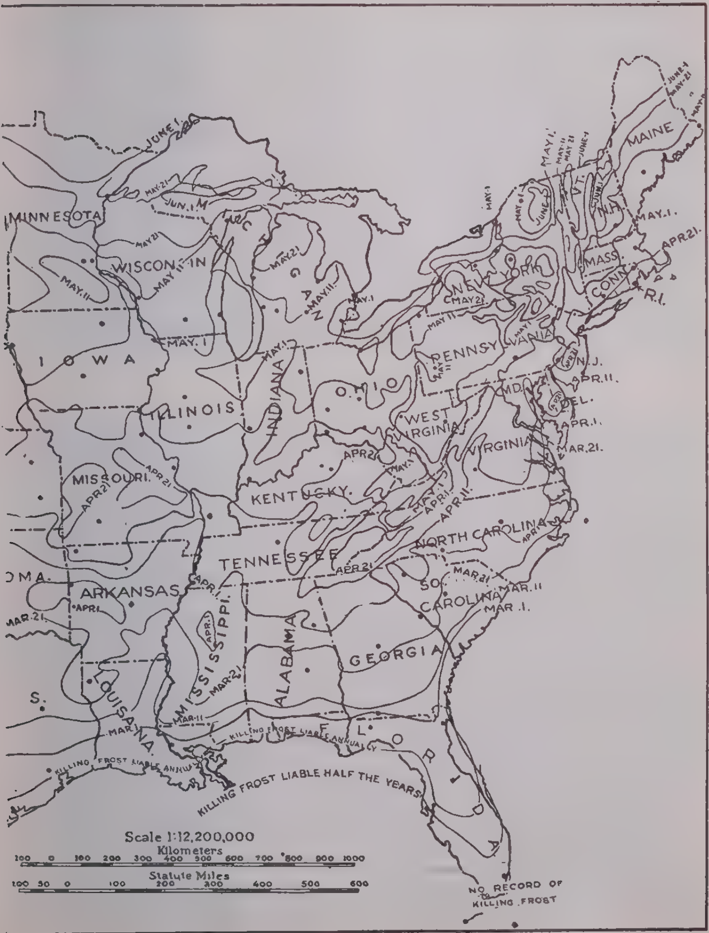
Transplanting is quite successful in humid climates and is very generally employed in the Eastern and Central States. In arid sections seeds are best sown where the plants are to stand.

AVERAGE DATES OF KILLING FROSTS

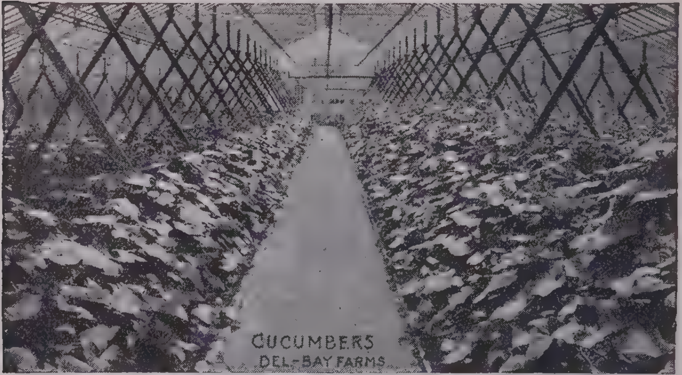


Killing frost occürs on the average one year in two as late as the dates indicated on this chart in the various sections of the United States.

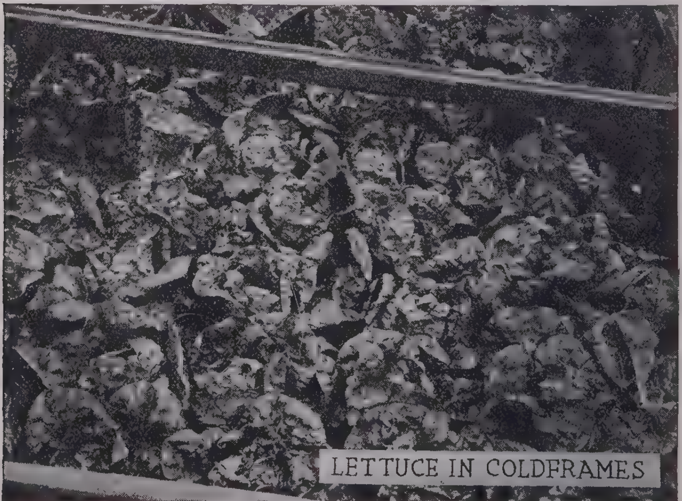
A GUIDE TO PLANTERS



EXAMPLES OF GROWING UNDER GLASS



Cucumbers should be planted in a temperature of 70° by day and 60° by night

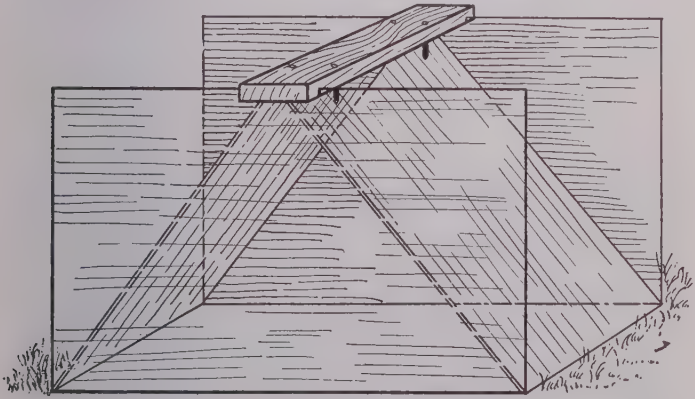


Lettuce seeds are generally planted in hotbeds or greenhouses 8 to 10 weeks before they are wanted for field planting

Chapter V

THE USE AND VALUE OF GLASS

The Use and Value of Glass.—In nearly all kinds of gardening glass is indispensable. Glass includes forcing frames or "cloches" as the French call them, cold frames, hotbeds and greenhouses and very often the gardener progresses in about the order named in developing glass gardening.



GLASS PLANT PROTECTORS

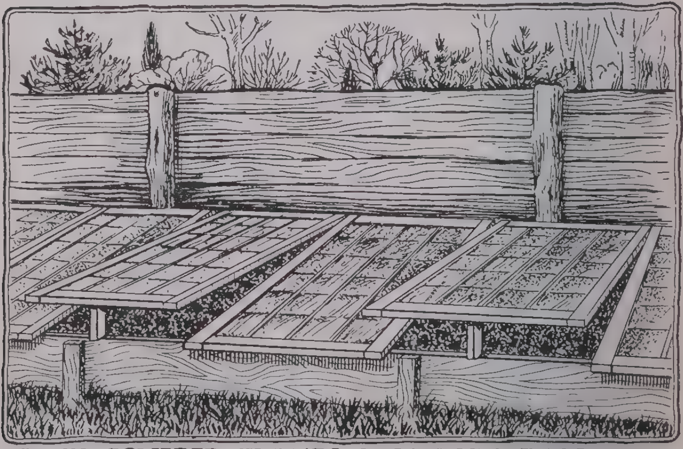
THE OBJECT OF GLASS GROWING
Is to get crops to market before their normal season and thus obtain higher prices

Many crops, such as the root crops, sweet corn, beans, peas and cabbage, are grown profitably without glass, but the ambitious gardener with a love for his calling can never be quite satisfied until some glass is operated.

The Principal Object of Glass is to produce crops so they will reach the market before their normal season, as then they command the highest prices. In some sections the ordinary growing season is too short to mature some crops unless the plants obtain a good start under the protection of glass. Where the growing season is longer, two or more crops can be grown on the same land the same season by giving the first crop an early start.

In some sections crops are matured under glass at a good profit, such as cucumbers, muskmelons and tomatoes, etc.

Wherever glass is to be used there should be an ample sup-



SASH COVERED FRAMES, SHOWING WINDBREAK
of board fence in back of frames

ply of water which can be led about through iron pipes or rubber hose, or both.

Locating the Frames.—Coldframes and hotbeds should be located where they will be protected from severe north and west winds. Hedges, trees, buildings or board fences are used for wind breaks.

Southern exposures are desirable. Have the frames run parallel to each other, with alleys between for handling sash, mats, frames, dumping snow from the frames, and so on. Two feet is the narrowest limit. Wider alleys permit the use of wheelbarrows between the frames, which will be found advantageous.

If there are to be many frames they should be near the farm buildings, where a comfortable room can be used for transplanting, if the growing is to be in flats. If the plants are to be grown in soil in the beds, the work must be done in the frames.

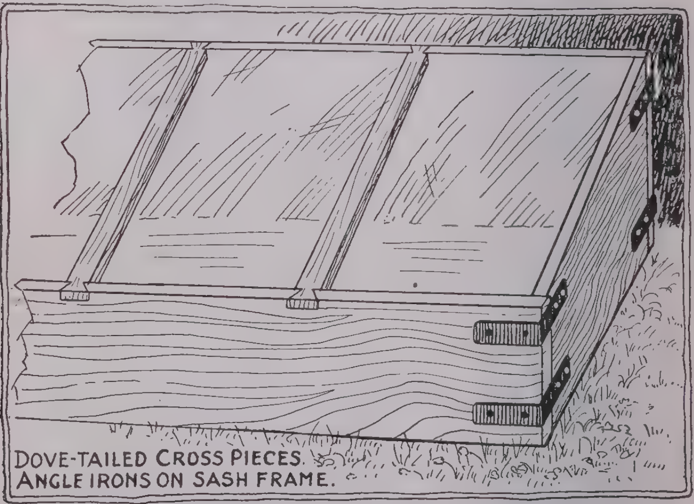
Hotbed Frame Pits.—Hotbeds are now made to be heated by steam or hot water, but generally are heated by the fermentation of fresh stable manure in a pit under the frame.

The Hotbed Pit must be well drained, naturally or artificially by tile running from the bottom of the pit.

In the North, pits are made from 18 to 36 inches deep, according to the season when the hotbed is to be started. If to be used early in March the heating material should be at least two feet deep. If later in the season, less will suffice.

Tropical plants like eggplant will require 30 inches of manure in order to keep up a good temperature for eight weeks. Pepper and tomatoes require considerable heat. In the South less manure will be required according to latitude and climate.

To avoid digging the pit when the ground is frozen, the work is done in the autumn and the pit filled with leaves or straw to keep out the frost and to keep the sides and the bottom of the pit from freezing. Otherwise a large amount of the heat given off by the heating material will be required to thaw out the surrounding earth.


DOVE-TAILED CROSS PIECES.
ANGLE IRONS ON SASH FRAME.

THE FRAME EXTENDS TO THE BOTTOM OF THE PIT

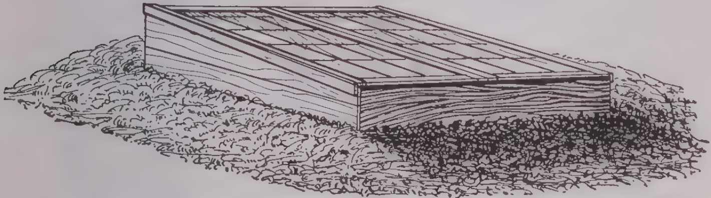
How to Build Hotbed Frames.—The frame may be made of wood, concrete, brick or stone. Wood is the material most generally used, but concrete is the most durable and is the cheapest in the long run. The frame extends to the bottom of the pit.

Locust, cedar and chestnut make the most durable wooden frames. One inch material is generally used. Hotbed sash are made in a standard size, 3×6 feet, consequently the frames are made in varying lengths in multiples of 3 feet, and 6 feet wide.

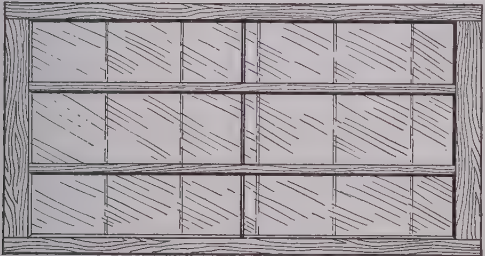
For a family or home garden, the frames are made for one, two, three or four sash. Four sash frames are standard size. For the corner posts 2×4 inch material is used.

Commercial growers have hotbeds and coldframes a hundred feet or more in length. The posts are placed about 10 or 12 feet apart, according to the length of the lumber used for the frames.

HOTBED ON TOP OF GROUND. NO PIT.



THE HIGH SIDE OR BACK SHOULD BE TO THE NORTH



The upper side of the frame should be about six inches higher than the lower side, or about 16 inches high, the lower side being 8 to 10 inches high.

The frames should be set so as to run east and west, with the high side or back to the north, with the low side south. This gives the sash a slant to the south so the sun's rays will strike the bed more directly, giving the strongest light and heat. The slant is sufficient to shed water readily.

It is well to use 2×3 inch crossbars, planed on the upper side for the sash to slide on and to hold the sides of the frame firmly in place. These crossbars should be dove-tailed into the sides as shown in the illustration.

For small frames 1×3 inch crossbars will answer. A half-inch strip nailed lengthwise in the center of the crossbars will permit the sash to be worked without binding, saving vexation and sometimes glass.

The crossbars should be placed ½ inch more than 3 feet apart, from center to center, to allow free play of the sash and more than this if they are to be provided with a ½ inch strip in the center.

When masonry walls are used the foundations should be placed below frost.

Brick walls for pits should be thirteen inches thick from the base to within three or four inches of the top of the ground and there narrowed to eight inches, the inside face remaining vertical. The wall should be built at least four feet below the surface. This will insure safety if the normal frost line is 3½ feet.

Concrete walls should be 8 inches thick, resting on 12 inch foundations.

How to Build Sash.—The sash should be of cypress or cedar. Soft wood sash rot quickly. The joints should be painted with white lead before the sash are put together and the sash painted before and after glazing, to make two coats of paint. Thereafter it should be painted every year.

Standard sash are usually made for three runs of 10×12 inch glass, lapped about ⅛ inch, 18 panes being required for each sash.

Sash should be stored in a dry place, after painting, or stacked and fastened by nailing vertical strips down the sides of the pile of sash to prevent gales of wind blowing them about. Cover the tops of the piles of sash with boards to prevent glass breakage, particularly where there are boys.

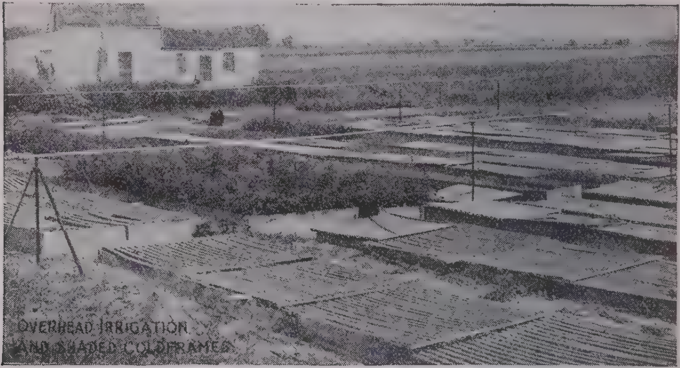
Double Glass Sash were popular a few years ago, but their use seems now to be growing considerably less. The double glass sash affords much greater protection from cold than the single sash, in many localities doing away with the necessity of handling mats over the frames—the plants receive light during the entire day in the coldest weather when single sash are covered with mats. The frames warm up earlier and stay warmer than single sash.

On the Other Hand Double Glass Sash are very much heavier and harder to handle than single and where there are many sash, men complain of the weight. Dirt accumulates between the glass and reduces light, producing weak plants unless the glass is cleaned on the interior surfaces, which is costly.

Waterproof Cloth and Other Glass Substitutes are offered. For temporary uses they may have a place, but they lack durability and do not, as a rule, give as good results as glass.

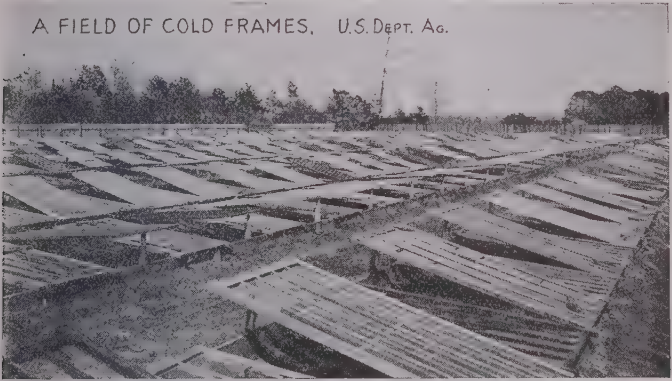
Cold Frames.—A pit such as described without heat, covered with a frame and glass sash, will keep safely over winter many plants used for decorative purposes in the garden in the summer. Cold frame pits need be dug only as deep as required, which is usually about two feet, except where the frames are of masonry, when it is necessary to run the walls below the frost line.

Tender roses in pots, the pots plunged to the rim in peat moss, sawdust, leaves or other light material, will keep as well in a coldframe as in a greenhouse. The frames in severe weather must be covered at night with mats, which will keep the plants from freezing where the thermometer does not go below ten degrees below zero.



OVERHEAD IRRIGATION AND SHADED COLD FRAMES

Azaleas, antirrihinums, carnations, camellias, fuchsias, geraniums, pansies, auriculas, pentstemons, verbenas and many other plants can be kept over winter in coldframes. The plants should be taken up from the garden and potted, so as to have a month's growth previous to severely cold weather. Until that time the plants may usually be exposed to the light and air by removing the sashes, except on severely cold or stormy days. This may continue, if the weather is favorable, until nearly the middle of November and sometimes later. From that time until the middle of March, but little watering will be required. In severe weather accompanied by snow, the cold frame may remain closed for two weeks at a time. Roses, camellias and azaleas may remain a month or more, when dormant. Whenever conditions will permit, admit light and air.



LIGHT AND AIR SHOULD BE ADMITTED WHEN CONDITIONS PERMIT

Heating Material for Hotbeds.—Horse manure is the heating material usually employed, which should be fresh, not too loose and strawy, but somewhat compact. It must have a fair proportion of straw or it may fail to heat. If there is too small a percentage of straw, leaves may be added. Manure with shavings will not answer.

The manure should be handled about ten days to two weeks before it is calculated to have the hotbed ready for planting or seed sowing. A covered shed is desirable for handling the manure, if it is available, as cold rains and severe weather hinder fermentation.

Manure received from a distance on cars or boats may be in condition for the pit when received, although turning may be necessary.

Make piles that can be handled conveniently, about 5 feet wide, 4 feet high and as long as desired. Tramp the manure in piling. Ordinarily the pile will begin to steam in a day or two. If dry a little hot water will start fermentation. When the pile is fermenting well, restack into other piles. In two or three days the new piles will heat up and it will then be ready for the pit, if the material is uniformly hot. If not, another piling or handling should be given.

Sometimes the manure heats so quickly that it may have to be wet in order to prevent it from burning. Straw or litter mixed with the manure will prevent this trouble.

Filling the Pit.—Throw six inches of manure into the pit and tramp it down evenly and firmly, not only in the center of the frame but all along the sides and particularly in the corners, so as to have a uniformly even surface. Then add another layer of manure and tramp it down firmly as before.

When the pit is filled and the manure tramped evenly, cover with six inches of good soil. If plants are to be grown in flats, or seed sown in flats which are to be placed in the hotbed, then only two inches of soil will be needed over the manure to keep the air from becoming foul.

The Quantity of Manure to Be Used for the purpose of supplying heat should be judged by the season of year when the hotbed is to be started. Starting lettuce in December will require twice as much manure as for a bed started in February or March. If started in March, not very strong heat will be required and radishes will thrive on second heat, as in a bed from which a crop of lettuce or other vegetable has just been removed.

Radishes require less heat than lettuce. Cauliflower or cabbage requires less heat than tomatoes or eggplant. For forcing cucumbers more heat is required than for lettuce.

Lettuce beds during winter should be kept at a temperature ranging from 50 to 70 degrees F. for radishes from 40 to 60 degrees. For cucumbers and tomatoes from 70 to 90 degrees.

The frame should be banked around the outside with manure or earth to keep out cold.

Regulating Heat before Planting.—Before sowing seeds or placing plants in the hotbed, plunge a thermometer in the bed and do not begin operations until the heat begins to decline from 100 degrees.

The hotbed should stand a day after it is prepared, to allow the soil to become thoroughly and evenly heated.

Hotbeds are usually started in the vicinity of New York City about the first of March. Hotbeds can be started in the latitude of Boston or New York in November or December and if the beds are properly handled, three or four crops may be taken from the beds in one season.

Beginners are likely to start a hotbed too soon. Good plants for transplanting in the open ground need not necessarily have age, but they must be vigorous and stocky. When the hotbed is started too early the plants may have to be slowed down in development, in order to hold them until the weather is suitable or the field ready. Stunted plants of this kind are slow to get started again.

Cabbages and cauliflower may be started in the North about six weeks before they are to be set out in the field; tomatoes about six to seven weeks; beets and onions four to six weeks.

Ventilation.—Caution is necessary in airing hotbeds, more so than with coldframes. The heat from the manure combined with that of the sun will sometimes run the temperature up so high as to destroy every plant, if proper airing at the right time has been neglected.

Watering.—Hotbeds require more watering than cold-frames, the greater heat evaporates the water and water must be supplied liberally, applied through a fine rose on a sprinkling can, whenever the surface soil seems dry.

Other Types of Hotbeds.—Some gardeners dig the pit a foot wider than the frame and do not line it with boards. Portable or box frames are placed on top of the manure, which is built up to the level of the earth and the frames banked with manure. The beds will settle and should be raised somewhat above the surrounding surface. More manure is required by this plan, but the beds supply heat for a longer period.

Hotbed frames are sometimes set on top of a pile of fermenting manure made on the surface of the ground, without a pit. The piles are well tramped and made level, extending some distance beyond the frame. This style is used where the drainage is poor. The frame must be well banked with manure.

Management of Hotbeds.—Experience alone can teach how to manage a large number of sash covering several different crops. A thorough understanding is necessary of each crop's requirements as to heat, moisture and other conditions. Care must be exercised not to chill the plants, but usually the greatest dangers are those of **too close atmosphere and too much heat,** which makes the plants soft; **crowding,** which makes them weak and long drawn out; **wilting** due to too much heat and too little moisture; and **weak and spindling** plants caused by being too far from the light.

Careful watering is necessary so as not to lessen the heat and the watering should be done early in the day, in the middle of the forenoon, usually. If possible use water having a temperature of about 60 degrees.

Ventilation is important. When the drops of water collect on the glass, ventilation should be given if it is safe, according to the weather.

Possibilities from Glass.—In regard to the amount of produce that can be taken off per season, per sash, this depends largely on the skill of the gardener. If three crops are grown and the beds properly managed, the result to be expected may be about as follows: $2.50 for the first crop, $2.00 for the second and $1.50 for the third, a total for the season of $6.00 per sash. This figure is very often doubled.

The first crop, lettuce, four dozen plants to the sash, will likely average 60 cts. a dozen or better. This followed by lettuce or radishes. Cucumbers for the third crop, started about April first, will begin to bear in June. Cucumbers vary in price, sometimes yielding as high as three dollars per sash. Half this amount will be profitable.

Harvest Time.—In market gardening on a perfected scale, the harvest time is practically all the time, extending throughout the year.

Harvesting market garden crops does not always depend on maturity. Some crops should be harvested when they will bring the most money. Some vegetables cannot be gathered until they are ripe, such as cauliflower, melons or celery, as otherwise they are worthless. Some, like beets, spinach and lettuce after a fair amount of growth, can be marketed at a profit.

Crops gathered when young and tender must be carefully handled as they are spoiled by careless handling and packing for market.

Capital Required.—One successful market gardener estimates that two acres will return a fair profit, if properly handled. By his method $3,000 capital would be required, with three men and two horses. For ten acres $5,000, six men and three horses. In this figure, sash, mats and shutters are estimated at $4.00 per sash and a liberal outlay for manure.

Spent Hotbed Manure is used for composting. It has lost most of its nitrogen but is valuable organic matter and should be used on the garden or in potting soil after composting.

Flue Heated Frames.—Hotbeds are sometimes heated by flues leading from a furnace burning wood or coal.

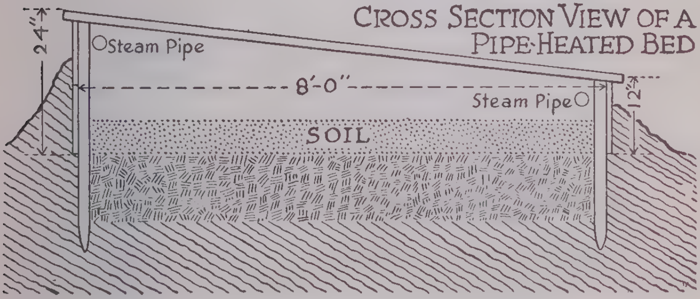
The fire box is at one end of the frame, constructed by the owner's labor, 4 feet long and 2 feet square, with an ash pit below the grate bars.

The flue extends from the fire box to the other end of the frame which may be 60 feet or more in length. The flues are built of brick, stone, tile and vary from 6 inches to a foot in size. Near the furnace the flue is 3 feet under the surface, ascending gradually to 1 foot at the chimney end. The flues in some cases are divided, running around each side of the frame, meeting just before entering the chimney.

Flue heated hotbeds dry out rapidly, and water must be frequently supplied.

Steam heated and hot water heated frames are being used more and more. No mats are required when either of these systems is used.

Hotbed Covers.—Early hotbeds require night protection over the glass and sometimes during the day in severe weather. Old carpets serve this purpose. Burlap with straw or wool quilted in is good and seedsmen and implement dealers offer hotbed mats of various kinds.

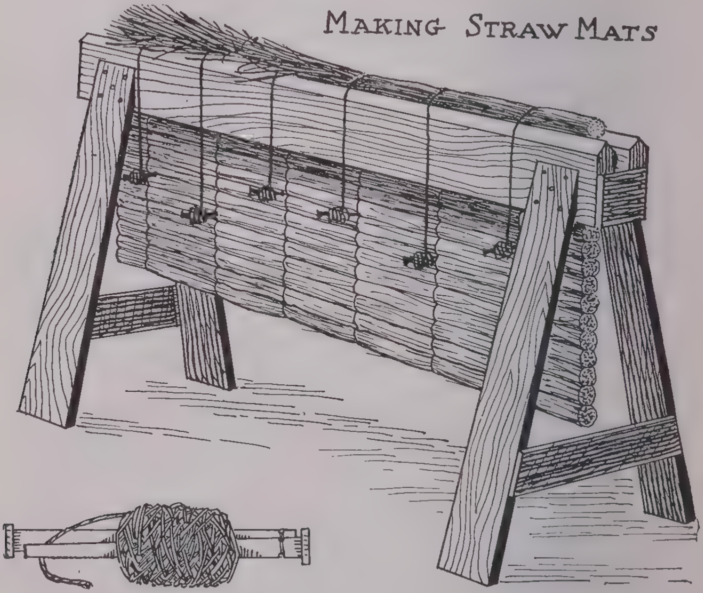


STEAM HEATED FRAMES
Are being used more and more because of the scarcity of manure

A neat appearing and serviceable mat is made of rye straw. They are somewhat awkward to handle and are bulky.

A saw-horse frame is made with a double top. Six runs of tarred twine are used to secure the strands of straw. Twelve of twine are used, six hanging on either side. Two wisps of straight straw are laid upon the frame, with the butt ends outward, the heads overlapping in the middle. Two opposite spools are then brought up and a hard knot tied at each point. The projecting butts are then cut off evenly and the mat dropped through and the next pair of wisps added and fastened in the same manner.

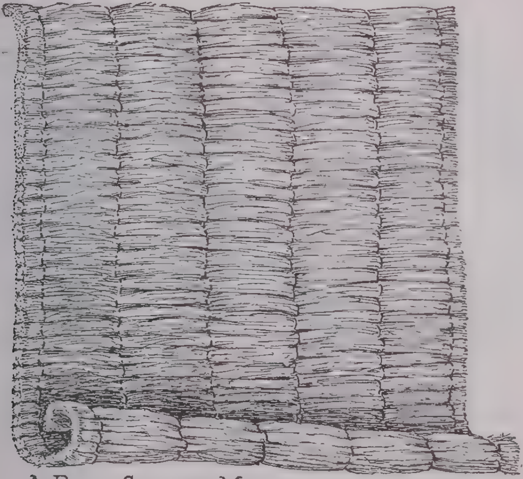
Rye for this purpose is best cut before the grain is in the milk. Threshed straw is not so good and if it contains ripe grain it will draw mice.



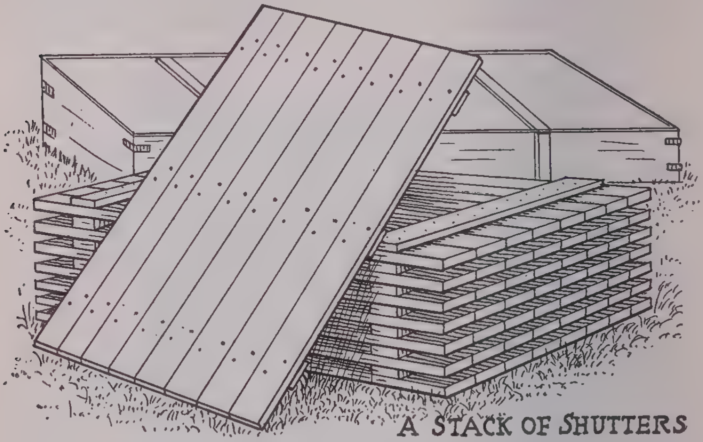
A SERVICEABLE MAT IS MADE OF RYE STRAW

Board Shutters, of half-inch or five-eighths inch material, 3×6 feet are sometimes used over the mats to keep them dry and prevent their blowing away. In some cases heavy stones or other weights will be required. Shutters are sometimes used without the mats.

Coldframes are less expensive to make than hotbeds, because no excavation and no heating material are required. The height of the frame will depend on the crop to be grown. Radishes may be produced in a lower frame than tomato plants. An all-purpose frame is 12 inches high at the back and 6 inches in front. If plants such as tomatoes or cabbage are to be grown in flats, give the frame 4 inch additional height.


A RYE STRAW MAT

Commercial growers use hundreds of sash on coldframes many feet long, in several parallel rows. The sides are usually 1½ inch material and the end boards are held in place by cleats, the crossbars dovetailed into the side boards. The ends can be quickly removed and the whole bed thrown into one long bed. The sides also can be removed, the crops then appearing in an unprotected garden bed late in the season.



SHUTTERS AND SASH SHOULD BE NAILED DOWN
When stored, to keep the wind from blowing them around

Coldframes having no artificial heat and none other than what is received from the rays of the sun, are used later in the season than hotbeds. Water will be required in generous quantities and where the frames are extensive, one of the several patented overhead irrigating systems will be found to be a labor saver.

Coldframes should be located on level land. Uneven spots should be graded.

When the heat is spent from hotbeds, they practically become coldframes and can be used for that purpose.

The soil for coldframes should be prepared, as for intensive cultivation. Use plenty of thoroughly rotted manure, supplemented by judicious quantities of commercial fertilizer. If the frames are to be used for starting plants in flats, only the character of the soil in the flats need be considered. This should be rich compost.

Compost is sod or turf cut and turned upside down, in layers of about six inches deep, then a layer of six or eight inches of manure, followed by a layer of sod alternate with layers of manure until a flat pile is made as high as can conveniently be handled. After lying for a year it will be ready for use, after screening or shredding with a power shredder, then sifting and mixing a little sand with it to insure good drainage.

Plants started in hotbeds or greenhouses are often transplanted to coldframes to harden off or keep until the market is ready for them, or until they can be planted in the open ground. Coldframes are also used in forcing spring or autumn crops to maturity. Lettuce, radishes, cabbages and other crops are grown in coldframes. Some market gardeners operate several thousand coldframe sash.

Wintered Plants.—Plants started in the autumn can be carried over winter in coldframes so they will be ready for transplanting early in the spring. The plants, lettuce, cabbage, cauliflower, make no growth and become hardened, so they may be set out in the fields as early as the ground can be prepared.

The seeds are sown late in the autumn and the plants allowed to grow for four or five weeks, when they are transplanted into the frames, where they secure good root, without making much growth before freezing weather. In trying this work, begin in a small way.

Keep the frames uncovered until freezing weather, when sash and covers will be needed. Thawing quickly is fatal to frozen plants, so be careful of direct rays of the sun which are quite hot even in December.

Free ventilation will be required. If the ground is frozen the plants may stand a week or longer, with the sash covered with snow.

Forcing Boxes are made in various sizes, usually by the gardener himself. They can also be purchased of seedsmen and dealers in greenhouse material. A common size is 10 or 12 inches square and 6 inches deep, covered with a pane of glass. Frames of this kind are used for starting squash, melons, cucumbers, eggplant and for giving other plants an early start. Various devices are used affording protection so the plants can have an early start and be set out much earlier than they could be safely if not protected. In England and France bell-glasses are largely used for this purpose. In France some gardeners may have several acres under bellglass early in the season. New devices are offered frequently for this purpose. In America the hotbed and coldframe are the main dependencies for protecting and forcing early crops of vegetables, also flowering plants to be transplanted to the open ground.

Chapter VI

GREENHOUSES

Greenhouses are used more and more by florists and market gardeners. It is much easier to control conditions, heat, ventilation and moisture in a greenhouse than it is in a hotbed. It is also more convenient and comfortable to work in a greenhouse than over a hotbed.

A YEAR-ROUND INCOME
is possible to growers who use greenhouses

The development is usually along the line of a well cared for garden, then the addition of a few glass sash, and then a small greenhouse and finally a larger one and so on.

A greenhouse, properly managed will not be unemployed for more than a short time during summer—long enough to permit of making necessary repairs and to repaint it. It is good economy to keep greenhouses in repair. Some greenhouses cover acres of land.

One great advantage of a greenhouse is that it furnishes employment during the winter, so good men can be employed steadily throughout the year. It also enables the owner to market continuously and to be depended on by the markets for a constant source of supply.

Heat from coal is cheaper than heat from manure, particularly as the production of manure is declining. Work in a greenhouse is pleasant at all times, winter and summer, and less expensive and less troublesome than handling a lot of glass sash several times every day, necessitating the making and handling of mats.

Never attempt operating a large greenhouse until having mastered the care of a small one.

Building the First Greenhouse.—This may be of wood constructed by the gardener himself. Cypress material can be obtained, cut to proper length, so the greenhouse can be put up with only a few tools and a shovel to dig the post holes, if the sides are to be of wood. Chestnut or cedar posts with board sides, covered inside with building paper answer very well. Run the boards just below the surface of the earth or to the surface and bank up slightly with earth, to prevent cold and water getting under the greenhouse.

Concrete, brick or stone may be used for the side walls and these materials are desirable in large houses that are to be permanent. Masonry walls should be started below frost line. Walls of this kind are both warm and durable.

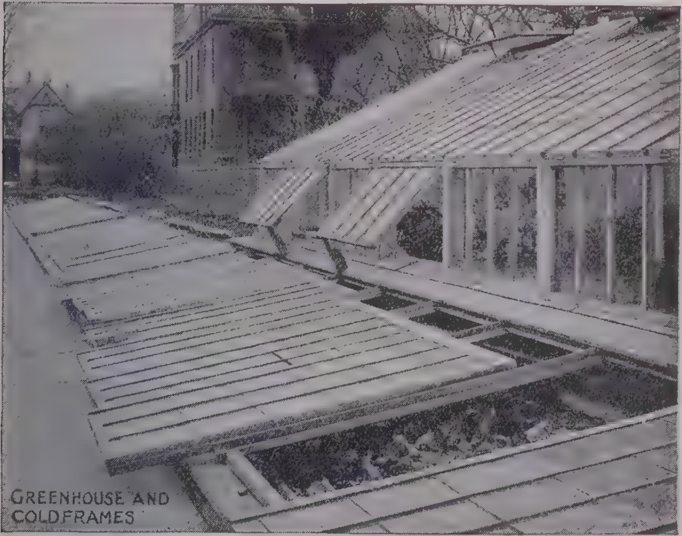
The wall is built 2½ feet above the grade and this provides for 4 feet of glass at the sides, between the top of the wall and the eaves. This height will permit of a walk next to the wall, if it is desired.

Plants never do well next to the wall so it is better to use the space for walks and keep the plants out where they will thrive.

All the wood work should be given a priming coat of paint before the frame is erected.

Cypress sash bars and other material will be found durable. Greenhouses of cypress have been in use for fifty years or more.

Complete blue print plans are furnished by the lumber concerns offering the material and only simple tools such as a hammer and screw driver will be needed to put up the frame. There should be a door at each end, if the house is very long, and a workroom at one end is desirable, with suitable benches for potting, storing pots, soil, tools, etc. The heater is usually located in a pit or cellar under the workroom, with a bin for storing coal and an opening for taking out ashes and putting in coal conveniently. The heat from the furnace will make the workroom comfortable for seed sowing, potting and preparing products for market.



MANY GROWERS USE BOTH HOTBEDS AND GREENHOUSES

The doors and sash for ventilation will be figured in the plan and supplied with the other material.

A very small house may have benches on either side 3 feet wide and an aisle or passage way in the center 3 feet wide, giving an inside width of 9 feet. Fifty feet in length will make a small experimental greenhouse. A house 30 by 100 feet is as large as it is desirable to make a start with.

Glass for the house can be purchased where it can be had most conveniently. Use double thick 10x12 inch glass.

Build where the greenhouse will have full sunlight. An even span house should be run north and south, if possible, but this is not as important as it might seem. A three-quarter span house should run east and west so it will receive the full benefit of the sun.

Greenhouse Forms.—The even-span is the most common form of greenhouse. The three-quarter span is not uncommon and the lean-to is largely used about dwellings by amateurs or private residents. The lean-to is the least expensive to construct. It is most successful when built against a wall running southeast and northwest. Side hill greenhouses are built like steps running down a side hill, built on the ridge and furrow plan with short slopes on the upper side. Work in side hill houses is none too easy on account of the going up and down hill.

Glazing.—The glass is laid in a mixture of putty and white lead, one part white lead to five parts of putty. Fill the shoulders of the sash bars with this composition and then lay the glass in place, pressing down firmly to squeeze out unnecessary surplus. The composition makes tight joints keeping water out and heat in. Place glazing points at the laps, on each side (the laps should be narrow, one-eighth of an inch or just a trifle more), and one or two points on each side of the pane between the laps. Special glazing tacks are made for greenhouse use.

After glazing give the whole house a second coat of paint and paint regularly every year.

Benches can be made of wood and covered with soil. Reinforced concrete benches are also used. Solid beds can be made by using masonry to keep the earth back and form uniform sides for the passage-ways.

In large greenhouses the soil is frequently worked the same as in an open field

In large houses, doors are provided at the end, large enough so horses and wagons can enter. The soil in these large houses is plowed, harrowed and sometimes seed sown the same as in an open field.

In small houses benches are desirable. Center benches 6 feet wide and side benches 3 feet wide can be worked conveniently, although some make the side benches 5 feet wide.

Three feet is as far as a man can reach over a bench and work steadily with any degree of comfort.

Heating.—Hot water is the best system for heating small greenhouses. The water retains its heat and the fire does not require such close watching as steam heaters, particularly at night. Hot water produces more heat from a given amount of coal than steam and with hot water it is easier to maintain proper moisture conditions.

In heating large houses with hot water, steam or electric pumps are used to secure rapid circulation.

In hot water heating care must be exercised in laying the pipes, to have a gradual rise from the boiler to the farthest point fron the boiler. From the point farthest from the boiler, the pipes must slant down gradually and evenly, back to the bottom of the boiler.

Hot water flows steadily and constantly through the pipes, rising and flowing to the rear of the house, the highest point in the pipes. By the time the water reaches that point, it begins to cool and as cool water descends by gravitation, it returns again to the boiler where it is reheated and makes the circuit again, keeping up a constant circulation as long as the fire is kept burning.

Somewhere, at an elevation above the highest point of the heating pipes, there should be an expansion tank, with the top always open. Through this tank the boiler is kept full. Cold water when heated expands, and unless there is room somewhere for this expansion, the boiler or pipes would burst if completely filled with cold water, which was afterwards heated. If the expansion tank is in the greenhouse the evaporated water will help keep the air moist.

Steam heating is used in some of the largest greenhouse plants in the country.

Piping.—Formerly four inch cast iron pipes were exclusively used for hot water heating, with calked joints. Threaded wrought iron pipes are now quite generally used for hot water. Two inch pipes are usually used.

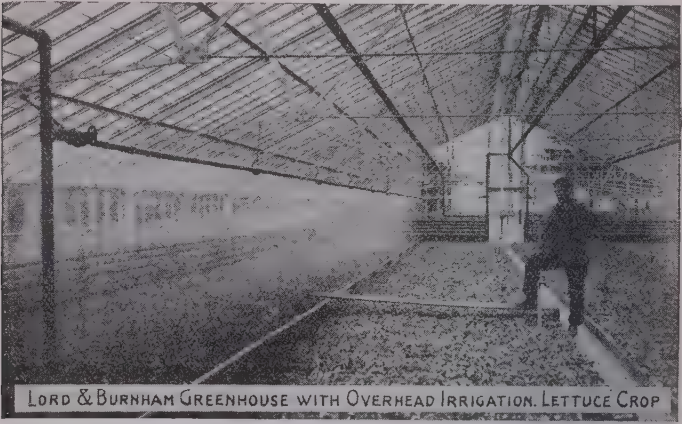
Heater.—The heater whether for hot water or steam should be of good size. It is economy to have an oversized boiler. It is economical to obtain the necessary heat without forcing the fire. Forcing fires means wasting fuel.

TYPE OF GREENHOUSE FOR GROWING CELERY. HOTBED SASH IS USED ON THE ROOF. MICH. AGRICULTURAL COLLEGE

To make the July market, in the vicinity of New York, celery seed is sown in greenhouse or hotbed about the middle of February

Fuel.—Coal is the most generally used fuel and large plants have automatic stokers. Recently oil has been used for fuel and the use of the oil system is increasing.

Large Greenhouses.—There are several large greenhouse building concerns that build greenhouses of all kinds. Steel and iron are the materials used in very large houses. The material can be purchased, ready for erecting, and built by the gardener and his own help, or the house will be erected under contract and set up, ready for use.


LORD & BURNHAM GREENHOUSE WITH OVERHEAD IRRIGATION. LETTUCE CROP

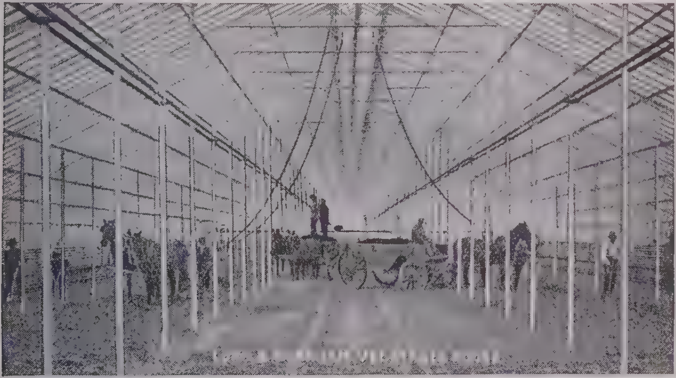
SOME LARGE GREENHOUSES ARE 400 FEET LONG—SOME EVEN LONGER

Large houses are built in various sizes according to the uses for which they are intended. Some are 37x200 feet, others 37x400 feet and others even larger.

Large double glass is used in these houses, 18x20 inches—18 inches up the roof, so as to have as few sash bars as possible to obstruct the light.

Before deciding on a large greenhouse, it is well to visit growers, look over their houses and learn from the owners the weak points they have discovered as well as the good points of their houses, profiting by the experience of others.

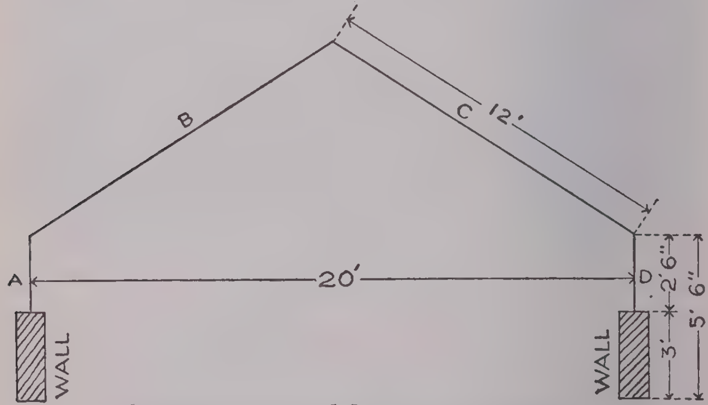
Rawson of Boston uses greenhouses 33 by 400 feet, 15 feet high at the ridge or apex of the roof. He figured that it required a fifty-horse-power steam boiler to heat 100,000 cubic feet of space to a temperature of 60 degrees, when the weather is zero F. At Boston where he was located, it required one ton of coal for every 500 cubic feet of space to heat at the same temperature and carry through from November 1st to May 1st; one foot of 1¼ inch steam pipe for every 20 cubic feet of space to heat the pipes arranged to equally distribute the heat. With hot water, 4 inch pipes were used.



Artificial summer exists here in winter. Help may be kept busy the year round

A Vegetable Greenhouse can be operated on comparatively small quantities of coal. The first or autumn crop of lettuce and radishes may be grown without heat even at points in the North. The second crop will require but moderate heat and will not cause the consumption of much coal. As the spring crops come on, the season is rapidly becoming warmer and coal consumption is reduced in consequence.

The Winter Crop must be kept warm, but if lettuce only is grown, a night temperature of from 45 to 50 degrees F. is required. Cucumbers and tomatoes require 60 degrees at night, but must not have too much heat when starting. The roots should have ample time to become well developed before the plants are forced or permitted to grow rapidly. Lettuce and radishes may be grown between the rows and will mature before it is necessary to increase the heat for the cucumbers and tomatoes.



GREENHOUSE MEASUREMENTS
(See text below for instructions)

Measurement for Greenhouse Glass

To get surface of glass, add A, B, C and D together and multiply by length of greenhouse.

To find the cubical contents of a greenhouse, multiply the length by the breadth by the height to the sill or gutter; then do the same from the sill to the ridge of the roof but divide the product of this latter computation by 2. Add the two results which will give the cubic contents.

Chapter VII

STORING VEGETABLES EXPERIMENTS

Storing vegetables and fruits is sometimes necessary. To store successfully, proper facilities must be provided. It must be decided whether storing will pay or not. The cost of storage must be considered, that is the amount invested in a storehouse; the annual interest on the money invested; insurance and repairs. A considerable amount of labor is involved in storing, and there is perceptible shrinkage.

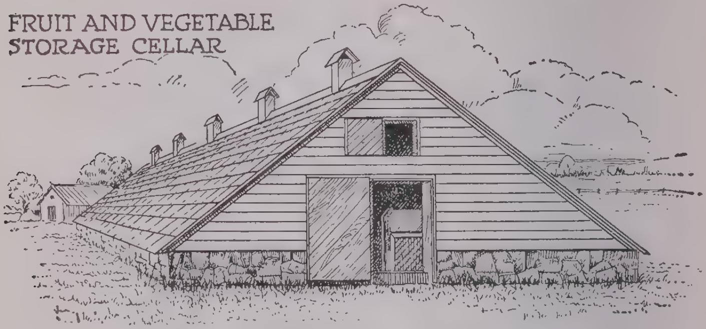
After all, there may be no advancement in price received ovcr what the crop could have been sold for when harvested. Sometimes prices are so low at harvest that storage is resorted to as the only chance to make a profit or even to receive a fair price.

Different Fruits and Vegetables Have Different Storage Requirements.—Ventilation, moisture and proper temperature are three essentials. Sweet potatoes and onions will not stand moisture, but must be kept dry. Some root crops shrivel unless kept moist. Some vegetables such as cabbage, keep better when stored before they have fully matured.

As a general rule a good storage temperature is about 34° F.

Crops that are not entirely free from disease, should not be stored and in handling crops to be stored, care must be exercised to see that none are bruised as this leads to decay.

For Home Use a well constructed pit is desirable for the storage of fruits and vegetables over winter. This supplies fresh vegetables when they are often difficult to obtain and high in price.



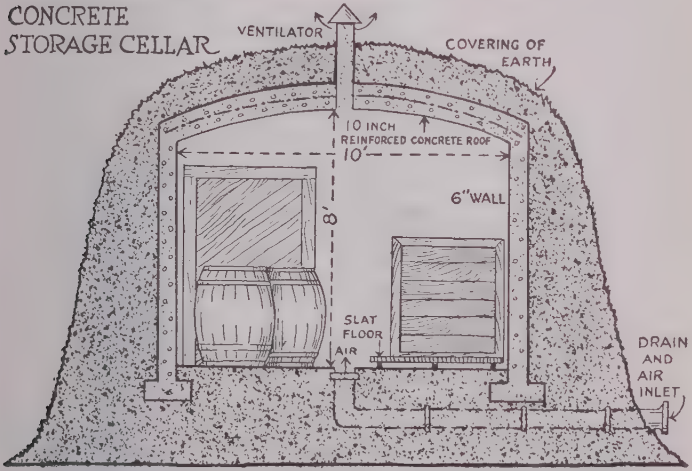
GOOD VENTILATION MUST BE PROVIDED

Vegetables and plenty of them are important to the health of the family and they are doubly important where there is stock or poultry to feed.

Store houses for fruits or vegetables must have good ventilation by admitting cold air from outside and by means of proper flues to carry off the warm air and dampness from within. The floor and walls must be dry and frost proof.

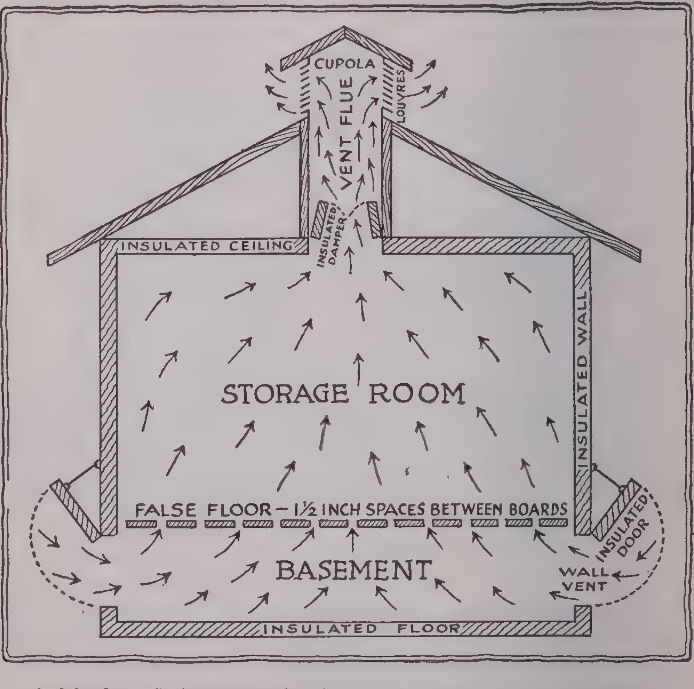
Bank Pits or Cave Construction in side hills in a well drained location are used for moderate sized storehouses, the roof formed by an arch or covered by poles or with rafters and ridge pole. If concrete is used, six or seven inch walls will be thick enough. An 8 inch arched roof covered with a foot of earth will be safe from frost.

Root Cellars are also constructed partially below and partially above ground, where the drainage is good. Concrete, stone, brick or other convenient materials are used. Storage houses for onions, potatoes and sweet potatoes are common wholly above ground, arranged along a railroad siding or so as to load and unload wagons and trucks conveniently. When masonry is employed the walls are constructed with a dead-air space. Hollow tile or blocks provide an air space.



AN 8-INCH COVERING OF EARTH IS NECESSARY
To be safe from frost

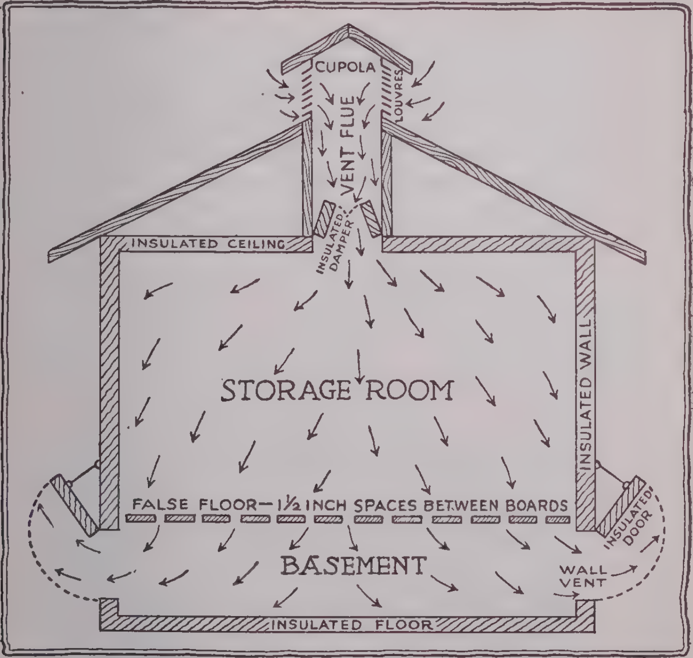
In Frame Construction, 2 x 6 or 2 x 8 studding is used, with the space between the studding filled with sawdust, ground cork, shavings or mineral wool. Shavings or sawdust used between the studding should have waterproof paper on each side of the studding. Ordinary building paper is not waterproof and should not be used. Mineral wool is used in slab form, attached with Portland cement or asphaltum cement directly to the interior walls, the cement making the material waterproof.



DOORS AND DAMPERS CONTROL THE AIR CURRENTS

Doors opening into the storage room should have insulation equal to that in the walls and should fit tight. Where electric lights are available no windows are needed. Where windows are used, there should be three sash, one behind the other in each window and there should be no more windows than necessary.

The Roof.—If there are two feet or more on top of the root cellar, this will be ample protection. If the roof is exposed, insulation may be obtained by roughly ceiling the cellar inside at a level with the eaves and packing the space between the ceiling and rafters with straw, hay or leaves. Be particular about the place where the roof joins the walls. This is the point of least thickness and where frost is certain to enter unless carefully protected. Old carpet, burlap or similar material answers very well for packing at this place.



ALL DOORS AND DAMPERS MUST BE INSULATED

Concrete construction of 8 inches or more in thickness or stone walls 18 inches thick usually keep out frost in New York State.

Drainage.—Partly or completely buried cellars should be graded around them so as to deflect all surface water. Tile should be laid around the bottom of the wall, on the outside to carry off excess water. A drain should be provided in the floor of the cellar, running out the south wall, if possible. This must be screened at each end, to prevent trash and earth entering and clogging and to prevent small animals from entering the cellar. The drain may serve also as a ventilator.

Ventilation.—Cellars of from 1,000 to 5,000 cubic feet capacity, should have 60 to 80 square inches of flue area, per 1,000 cubic feet capacity. Larger cellars from 5,000 cubic feet up, at the rate of from 45 to 60 square inches of flue area per 1,000 feet capacity.

Intake ventilators should be approximately the same area as the outlet flues. The inside ends of the intakes should be located near the floor.

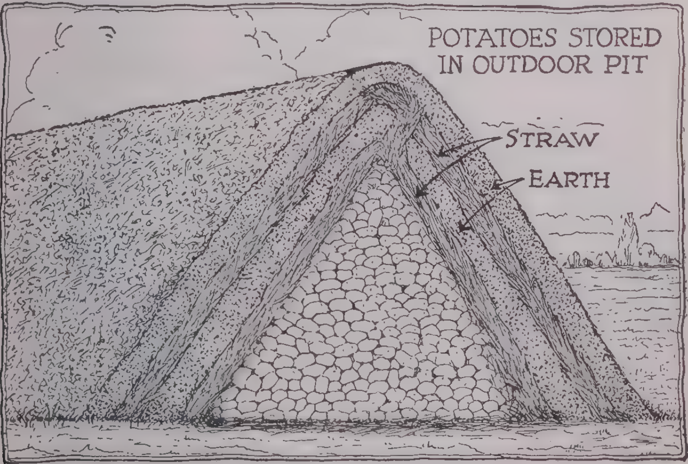
Drainage should be provided by vitrified sewer pipe not smaller than 4 inches in diameter and if used as a ventilator, not less than 6 inches. It must be well screened at each end.

Temperature.—A temperature sufficiently low to prevent the growth of bacteria or rot fungi, but not low enough to cause injury by freezing, should be maintained.

Temperatures for carrots, turnips, radishes and celeriac should not go below 33° F. Beets and kohlrabi may be held at 32° or 31° without danger of freezing. Salsify and parsnips need not be kept above 32°. Potatoes need not be held below 36° except where powdery dry rot infection is likely to occur. When several kinds of crops are stored in the same cellar, an average temperature of 33° to 36° gives best results.

Humidity.—The relative humidity should be such as to prevent serious evaporation, loss of moisture from the roots and a shriveled appearance. Excess moisture in the warmer season favors the growth of fungus and bacterial rot organisms. The moisture should never be so high as to show on turnips, carrots, celeraic or potatoes. Beets and kohlrabi will stand somewhat higher humidity and salsify and parsnips high moisture content in the air.

When heat is necessary, in small cellars a lighted lantern is sometimes sufficient. An oil stove will serve in larger places and several oil stoves or a coal heater in others.

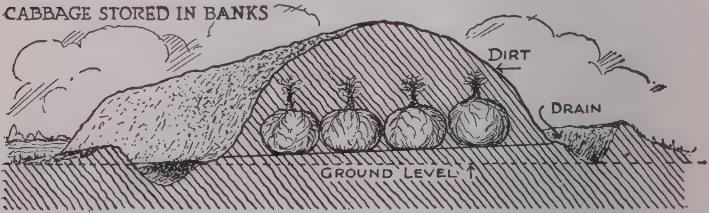

POTATOES STORED IN OUTDOOR PIT
STRAW
EARTH

AS IT GETS COLDER MORE LAYERS ARE NECESSARY

Potatoes may be safely stored in pits on a well drained spot.

Spread a layer of straw for the floor. Pile the potatoes in a long, rather than a round pile. Cover the pile with straw or hay a foot deep. Cover lightly with earth, pulling a handful of straw up through the soil about every 10 or 12 feet. As the weather grows colder, add more earth to a depth of about six inches or more. As the weather grows still colder, another layer of straw is added covered with an 8 inch layer of earth, with a handful of straw pulled through the earth here and there. This will keep potatoes safely when the temperature drops to 10 degrees below zero. In colder sections still another layer of straw and earth will be necessary. Firm the earth on the pile, with the back of a shovel to make it as nearly waterproof as possible. Potatoes keep better when stored in this manner. When stored inside, potatoes may be put in bins, barrels, boxes or bags, but must be protected from light.

Beets may be stored in the same manner as potatoes.



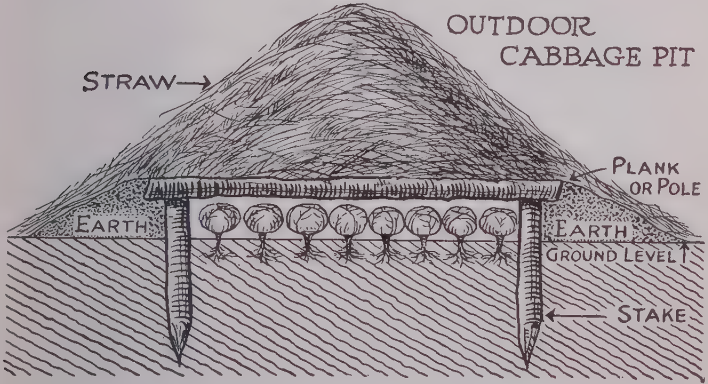
Cabbages should not be piled on one another

Cabbages can be stored in the same manner as for beets, but it is best not to pile cabbages one on another.

Celery can be dug and stored closely compacted in trenches in the earth, made in a well drained place. Cover the trenches with short boards laid across the trenches and cover the boards with earth. A board at the end of the trench is banked over with earth, which is removed to get at the celery as wanted.

Carrots may be stored in outdoor pits the same as beets or in a basement. They are not injured by slight freezing and therefore do not require as much protection as potatoes.

Onions must be mature and thoroughly dry to keep well. Place them in crates or loosely woven bags, as good ventilation is essential. A slight freezing will not injure onions if they are not handled while frozen. Onions may be stored in a well ventilated attic if such a place is available.



Stubs are left on the cabbage for convenience in handling

Parsnips are not injured by freezing, but it may be difficult to dig them where the ground is frozen. Parnsips may be stored the same as beets or carrots.

Sweet Potatoes should be mature when dug and left exposed for a few hours to dry off. Handle carefully. They may be stored in pits. When stored inside they should be cured in good ventilation for two to three weeks at a temperature of 80 to 90 degrees F. After curing gradually reduce the temperature to 55 and keep it at that point as long as the potatoes are stored. In this manner they may be kept until spring.

Pumpkins and Squashes should be stored in a dry, well ventilated place, above ground, if possible. Place them in rows on shelves so they will not touch each other. Keep at about 50 to 60 degrees.

SWEET POTATOES BEING COVERED WITH CANE TOPS

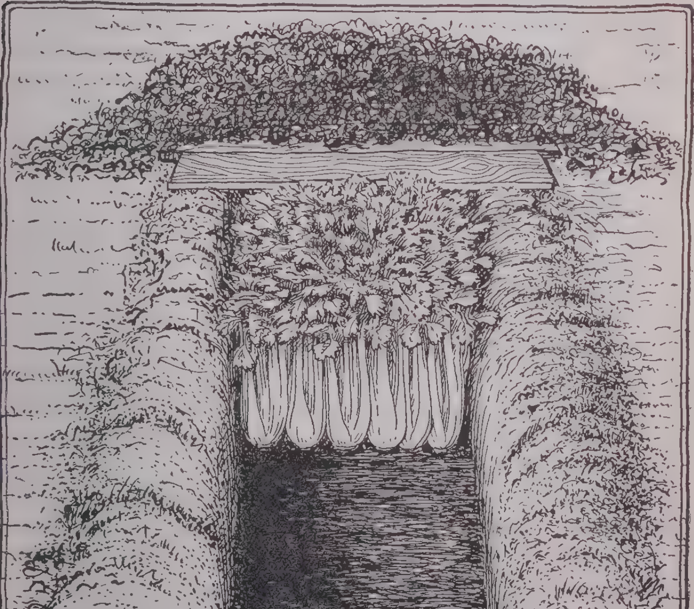
Sweet potatoes are first cured in a temperature of 80 to 90 degrees and then stored at a temperature of about 55 degrees

Salsify may be stored the same as beets, carrots and parsnips.

Turnips will stand a hard frost but alternate freezing and thawing injures them. Gather, top and store the roots in pits or storage cellar. In the cellar of a dwelling they give off odors that penetrate the house.

Apples will keep well under conditions suitable for potatoes.

Experimenting with Different Varieties.—One of the most interesting features of market gardening is studying varieties, testing and learning by observation and experience what varieties do best in the particular kind of soil and climate in which the garden is located and the best fertilizers and quantities of



THE BLANCHING BOARDS WHEN USED SERVE AS A ROOF
And are covered over with earth when weather gets very cold

fertilizers to use. Coupled with this is the buyer's preference, which must be considered. If a good crop of one kind cannot be produced, after testing different varieties, try another. Local adaptation may make one variety desirable in one place, where another variety may be preferred in another section of the country. Varieties should be tested under actual growing conditions and selected according to their fitness.

In making selections of vegetable seeds from catalogues, the older varieties which have stood the test of time and are well known and in general demand, usually are given brief descriptions. The newer varieties require puffing up to create a demand sufficient to sell them.

All improved vegetables were new or novelties at one time. Some endure and become permanent. Others drop out in a short time and are forgotten.

Have a place where the novelties can be tested on a small scale. If the variety does not prove valuable, the loss is small and the experience both interesting and valuable. Those proving worthy can be grown on a larger scale the next year. Do not depend on the State Experiment Stations for tests of this kind. Do your own testing and be guided by results. In the school of experience, there are no free scholarships Experience must be lived. Many theories, as everybody knows, gradually disprove themselves in time.

Varieties are recommended under "Cultural Directions," in the next chapter of this guide, because in some instances they are the only varieties easily obtainable, or because they are varieties that have been found best in the experience of the author, but other varieties may be best under different conditions. The varieties given are generally standard varieties which have stood the test of time and are most generally grown.

Chapter VIII

MARKETING,

COOPERATIVE ASSOCIATIONS

Marketing.—Successful marketing begins with crops of the very best quality and of good yields, but by no means does it end there. The crop must be well graded, uniform in size and appearance and packed attractively and even then the job of marketing is unfinished. Even when sales have been made at good prices to wholesalers or retailers the job of marketing does not end. The produce must be fresh and in good condition so the consumer will be pleased and want more of the same thing. A sale of produce that may not be up to standard, although sold at a good price, may injure the grower very much more than to have thrown the fruits or vegetables on the refuse heap. Reputation is a most valuable asset, worth striving for, and protecting when once attained.

In marketing, grade according to size, shape, soundness, color and ripeness, and put up in convenient sized, neat and attractive packages. The grower will do well to have his name or brand on the packages.

Market gardeners generally gather the crops from the field, take them to a packing shed where vegetables requiring it are washed, trimmed, graded and packed.

Washing removes the soil and shows the vegetables up in the most attractive manner; it keeps them fresh and prevents wilting. The green pods of peas and beans are soused in water before they are packed to prevent shriveling and so they will remain plump until sold in market.

Celery is carefully washed and trimmed before packing, also lettuce. Asparagus will look better and keep better if washed either before bunching or after bunching. Each package should be inspected by the foreman before it is loaded for market.

Packages.—In selecting packages careful consideration is necessary. If to be sold at retail to local buyers, attractive packages that will appeal to buyers and which can be offered at favorable prices may be used. If to be supplied to wholesalers, the packages must be such that the retailers will take them and can sell them readily to their trade. Consumers have peculiar notions and it is difficult oftentimes to change them, even with a better article at a more favorable price.

Small packages are growing in favor. More and more families are living in apartment houses and the tenants have no cellar in which to store fruit and vegetables. The desire to store vegetables seems to be growing less by those who have the facilities. The buying is more from day to day, small quantities easy to handle and soon disposed of. In some sections it may be that only bushel baskets, half bushels or smaller packages may be in demand. If any innovation is attempted, start on a small scale.

The appearance of the package oftentimes makes the sale. A neat bright package of convenient size is appealing, but it should also be a carrier that will deliver the contents in good condition. What will suffice for home trade may not do for shipping.

Some gardeners on Long Island put up what are called home hampers. A case about 10 inches deep, 21½ inches long on the bottom, 24 inches on top and 10½ inches wide. These are filled with a variety of seasonable vegetables and fruits. The selection may be ears of sweet corn, peas, beans, lettuce, a cabbage, carrots, tomatoes, parsnips or other things, which are sold to passing motorists or are advertised in the classified columns of newspapers in nearby cities. Mr. and Mrs. H. B. Fullerton were of the first, if not the first to make up attractive hampers of this kind. Mr. Fullerton is Agriculturist for the Long Island Railroad and Chief Grub Scout of the Boy Scouts of America.

Advertising.—The American people understand the advisability of advertising. Make yourself known wherever and whenever the opportunity offers to do so, in a dignified way. Brand the product or the package. Apples, oranges, and tomatoes are now seen in the markets wrapped in tissue paper which bears the trade mark, name and address of the grower. Peaches can be wrapped in the same way. A round, square or other shaped sticker can be placed on melons. Some melons reach the market wrapped in tissue paper. Packages can be labeled. Some growers advertise in the newspapers of nearby towns and supply consumers direct. The market wagon or auto truck offer advertising possibilities and should carry the owner's name and address.

In Selling to Commission Merchants, the first consideration is the honesty of the merchant and his reputation for fair dealing. The next is his financial responsibility, being sure that payment will be received for whatever shipments are made. There are honest, responsible commission men. On the other hand there are plenty of rascals in large cities and small towns who prey upon country people, getting whatever they can, paying nothing for it, or much less than the real worth on one excuse or another. When shipping to commission houses, insist on daily reports by telephone or telegraph.

Government Inspection of Shipments can now be had by arrangement with the United States Department of Agriculture, that is, on shipments in car lots, so that a shipper may know just how the shipment arrived at almost any large city, preventing fraudulent claims that produce was received in an unsatisfactory condition.

Cooperative Associations have been quite successful in marketing, although there have been failures, notably those fostered by lawyers or promoters who retain control of the organization. Cooperative associations are best operated by the farmers or gardeners themselves. If the organization requires a sales manager, it is best to employ one of their own, whom they may retain if successful or dispense with otherwise.

Some managers are employed at five per cent commission on the net sales—office expenses, telegrams and so on paid by the managers. Others are employed on a salary. It is better to have a good man liberally paid, than one of less ability at a less cost. In either case giving all his time to the business of the organization.

Avoid tying the organization up for a long or short period with silver tongued orators and liberal entertainers who may dazzle the committee with glowing reports of accomplishments, which often are actually very far from the statements made. This has cost the growers, in various lines in this country and Canada, millions of dollars.

Some cooperative associations transact business amounting to millions of dollars annually.

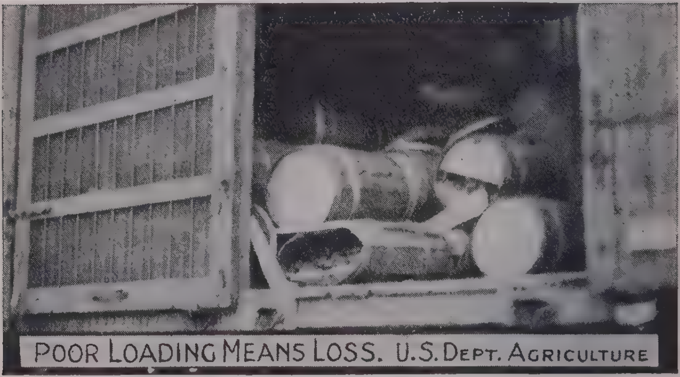
The capitalization of these organizations varies, but the number of shares which any member may hold is limited, sometimes according to the number of acres operated.

The management of these associations is with a board of directors who are selected on account of their peculiar fitness for the office and who control the manager.

A first class business man is required to successfully handle the business of a large cooperative association. He must be a man of business experience, tactful, shrewd and honest—a substantial, reliable man who will be constantly "on the job." He must be familar with merchandising, transportation, refrigeration, industrial conditions and markets. He must avoid gluts in the market and know where to sell to obtain best prices. He must use the telegraph and the long distance telephone frequently. It is profitable to have as manager, a man who can earn a large salary. A manager willing to work for a small salary might cost the organization considerably more than a man who might demand a salary of $10,000 a year, if the production of the district was sufficient to warrant a satisfactory volume.

Cooperative selling has many advantages. Individual growers may not have sufficient quantity to make carload lots, while a cooperative ships full cars, thereby obtaining more favorable rates. Details of icing and so on are cared for by the management. The grower who may be a poor market man, though a good grower can devote his whole time to production and he will receive more for his crops than he would otherwise.

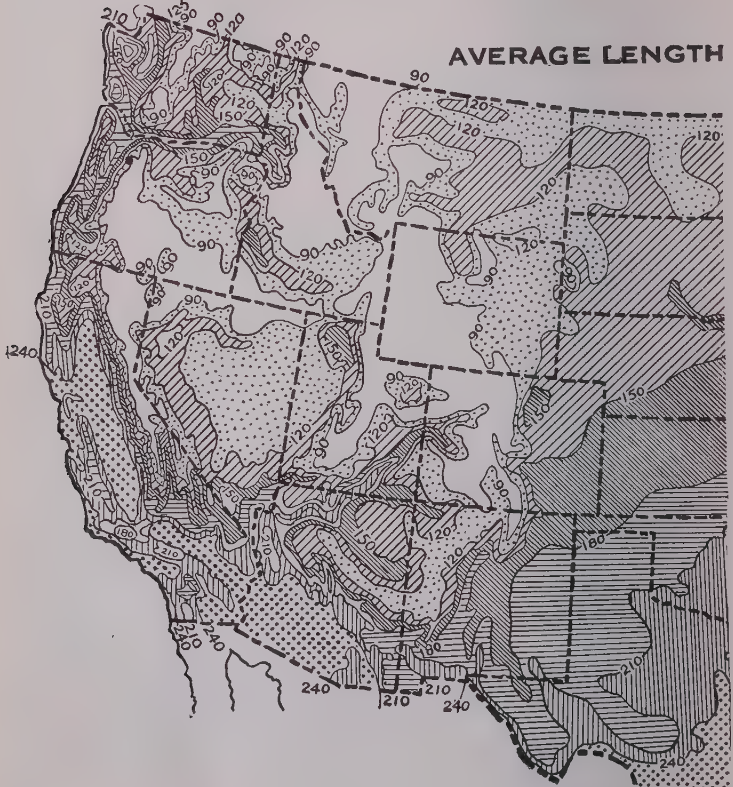
There are other advantages in associations. Meetings bring the producers together; they get better acquainted, exchange ideas, employ good talent to address their meetings and generally become interested in improving their locality. In some instances storage facilities are provided which may be desirable. A prosperous, happy community is worth striving for and a blessing to those who accomplish it.



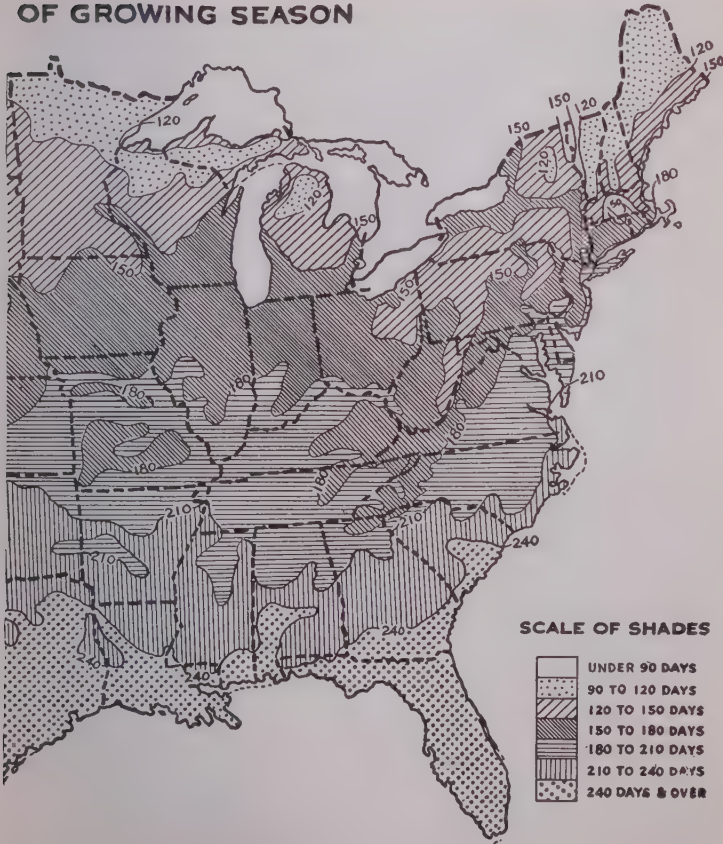
It is of little avail to farm with scientific care if every step is not followed through. The crop is not harvested until it is well packed

COMPRESSED AIR SPRAYER

A MAP FOR HANDY REFERENCE



VALUABLE IN SELECTING A FARM SITE



ARTICHOKE (GLOBE)

Chapter IX

CULTURAL DIRECTIONS

(Arranged in alphabetical order for quick reference)

ARTICHOKES

Artichoke, Globe (*Cynara scolymus*).—The Globe artichoke is commonly grown in European gardens where it is a popular table dish. In America, it is only recently that the Globe artichoke has been in sufficient demand to warrant its being grown on a very large scale. Even now the demand in some localities is very limited and before making an extensive planting, it will be advisable to ascertain what the demand is likely to be in the market to be supplied.

The Globe artichoke is a hardy perennial plant and will produce good crops for several years in home gardens. For market, the plants should be renewed every two or three years.

Green Globe is the variety commonly grown in America. A purple variety is also obtainable, but the green is preferred for market.

The Globe artichoke is easily grown from seed either by starting the plants under glass in March and transplanting the young plants into pots before setting out in the open, or seed may also be sown early in the open ground and the plants will be ready for transplanting the following spring. Edible heads may be cut the first season.

Plants of the Globe artichoke from seed do not always come true and it is well to propagate from offshoots from the old main root of plants that bear well and in this way establish a uniform and prolific strain. In a well cared for bed, each plant may have from sixteen to twenty suckers or offshoots. It is advisable to remove all but five or six of these young plants so there is always an abundance of material for young stock. This method of propagation is best performed in the spring when the leaves have attained a length of twelve to fifteen inches. In removing the suckers, shovel away enough earth from the base of the plants so the point of attachment to the old root may be seen. With a sharp knife cut away the young plant with a few roots attached. The young plants may be then set where they are to remain. The rows should be three feet apart and the plants two feet apart in the rows.

In planning a bed, provide for a three-year duration, renewing one row each year. The young plants will fruit the same season they are set, prolonging the harvest season. The old plants are cut back to the earth in the autumn.

The Globe artichoke is a gross feeder and requires an abundance of well rotted manure, or other organic matter with commercial fertilizer, in order to obtain good crops. The manure should be dug into the soil between the rows and plants. Ample moisture is essential during the growing season and the plants respond well to watering, particularly in dry weather.

The edible portion of this plant is the round flower head or bud, produced on the terminal and side branches of a strong, upright stalk. The heads are cut when they have attained their greatest size, just before the appearance of the floral parts.

Exhibition heads are obtained by removing all except the terminal one and giving the plant an abundance of food and water. Remove the fruiting stalk as soon as all the heads have been cut.

Plants of the Globe artichoke are quite ornamental. The gray leaves have a somewhat fern-like, spreading habit and might be used to advantage in decorative foliage beds.

Winter Protection.—The Globe artichoke needs winter protection in the North. The foliage should not be cut or covered until late. November is the time in Western New York, the covering to be removed early in April.

In covering, a heating material such as leaves or manure will cause the crowns to rot. Cut the leaves back to within a foot of the earth and draw the remaining portion about the crown and cover with coal ashes, a generous pile over each plant.

Insects and Diseases. Up to the present time the Globe artichoke has been free from disease. A black louse or aphis is sometimes troublesome in summer, working on the underside of the leaves. This insect is controlled by spraying with nicotine sulphate and fish oil soap. One ounce of nicotine sulphate and four ounces of fish oil soap to eight gallons of water. Be particular to thoroughly cover the underside of the leaves and about the crown.

The Globe artichoke and the Jerusalem artichoke of which the underground tubers are eaten are not related and belong to entirely different botanical families.

Cooking.—Cut away the stem close to the bud, removing the large outside or bottom leaves. Place the heads in cold water for half an hour. Drain and cook for half an hour to an hour, in salted boiling water, adding a tablespoon of lemon juice or vinegar for each quart of water. When tender, drain and serve with melted butter, pepper, salt or salad dressing. Of the larger outer leaves only the small fleshy base is used, by tearing off a leaf with the hand, drawing the base of the leaf through the teeth, and extracting the "meat" from the base of the midrib. The center leaves are tender almost to the end, though the spiny center is never edible.

Artichoke, Jerusalem (*Helianthus tuberosus*) is in no way related to the Globe artichoke. It is one of the sunflower family and inclined to become a weed in waste places. It is exceedingly productive and thrives under adverse conditions. The tubers can be eaten raw or cooked.

ARTICHOKE (JERUSALEM)

The Jerusalem artichoke is a native of the United States and Canada and is perfectly hardy. Once planted it will thrive, and by digging, the tubers will be broken up, some remaining in the soil and continuing to produce.

The tubers are served boiled, pickled and in salads. In Europe they are more prized than here and several improved varieties are offered there. Hogs are fond of the tubers and will clean a field of them, if permitted to do so.

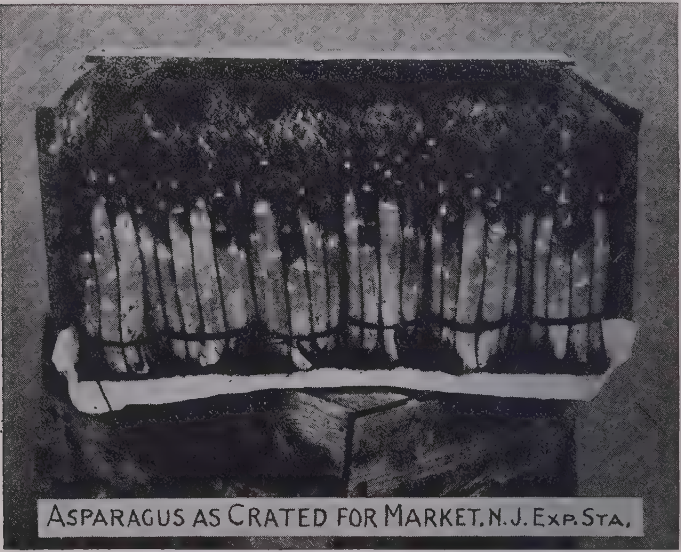
The Jerusalem artichoke will thrive in most any soil, but prefers sandy loam and responds to liberal feeding, yielding bountifully. The tubers may be planted whole, or cut into one to three eye pieces. Plant as early in the spring as the land can be prepared. The rows are usually three feet apart and the tubers or pieces about eighteen inches apart in the row. The crop can be dug as soon as the tops die down or may be left in the ground, as the tubers are not injured by freezing.

ASPARAGUS

Asparagus was used by the Romans at least two centuries before the Christian era, not only for food, but also for its

ASPARAGUS BUNCHES. N.J. EXP. STA.

medicinal properties. The value of this crop in the United States in 1919 was $5,102,135. Not all of this is newly created wealth, as some suppose, but only that above the cost of producing the crop, including the cost of seeds, plants, rent or

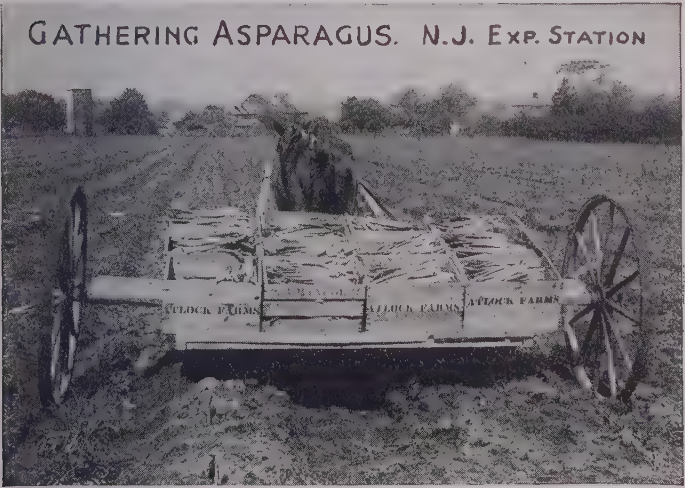


ASPARAGUS AS CRATED FOR MARKET. N. J. EXP. STA.

interest on land, taxes, fertilizer and labor. The States leading in production are California, New Jersey, Illinois, Massachusetts, South Carolina, Pennsylvania and New York.

Asparagus belongs to the Lily family. Asparagus officinalis is the species used as food, a branching herbaceous plant, from three to seven feet high. The rootstock is perennial, making a new growth each year of from one to three inches, extending horizontally and generally in a straight line. The older part of the rootstock dies.

The new portion of the rootstock with buds will form new shoots, while the dead scales of previous growths are shown on the opposite side. The young root formation takes place a little above the old roots, so the plants gradually rise above the original level, necessitating the annual hilling up or covering of the crowns with additional soil.



The shoots are cut and laid in rows. Boys should follow quickly laying the shoots in baskets The baskets or boxes placed on a wide-carriage cart as above

Asparagus is one of the most important vegetable crops. The acreage is constantly increasing but asparagus has always brought good prices. There are many cities and towns still poorly supplied with asparagus, offering good markets for this crop. Canneries are using large quantities of asparagus and so far have offered fair opportunities to growers.

Soils.—Asparagus flourishes in temperate regions and is grown successfully over the whole United States, and it is grown on a great variety of soils. Deep, rich, moist sandy loams and sand produce the best results with asparagus. Given a good supply of organic matter or humus, good drainage, plenty of plant food and moisture and good crops should result. Large sized stalks of good quality bring the highest prices in market.

Seed.—The best seed procurable, regardless of price, should be used. Until the plants are four years old, they do not produce really good seed. The seed should be selected from plants free from rust and from plants producing a good number of very large shoots. There may be several female to one male plant, sufficiently close to insure thorough pollination, the plants marked by stakes driven in the ground. The flowers are generally dioecious, staminate and pistillate flowers borne on different plants, though some flowers have pistils and stamens in the same flowers. Ten inches of the tops and ends of the branches should be cut off to encourage better development of seed on the lower branches. If there are many berries, remove some from the extremities. The seed should not be harvested until fully ripe, showing a bright red color.

Seed growers cut and gather the stalks bearing the ripe seed, tie in bundles and hang them up in sheds or other dry place, where birds cannot get them and then thresh. The chaff is removed and the berries soaked in water for a couple of days when the seed is separated from the pulp which has become soft by the soaking. The berries are then rubbed between the hands or lightly crushed with a block of wood, to break the outer shells. The mass is then placed in water and washed. The pulp and shells pass off when the water is poured off. The seed is washed several times and then spread out to dry. The light, poor seed will float off, while the good seed, being heavy will sink. The larger seed can be selected by using a properly meshed sieve. It may take two weeks to thoroughly dry the seed when it can be stored in cloth or paper bags, until needed. Only the largest, plumpest seed should be used.

Raising Plants.—Use fresh seed which is distinguished by its glossy black color and smooth surface. Old seed is grayish and has a somewhat rough surface. Screen out all but large, plump seed.

Select rich garden soil for the seed bed, in a well drained situation. Enrich it well with manure and pulverize thoroughly. Sow the seed early in the spring in the North. The seed germinates slowly, from four to six weeks, and needs an early start so as to make a good growth the first season. In the South the seed may be sown either in the autumn or spring.

For hand cultivation the rows should be marked out in straight lines, fifteen inches apart. For horse cultivation the rows should be three feet apart. Set the drills an inch deep, dropping the seeds two to three inches apart. The covering can be done with a hoe, pressing the soil down over the seed, with the foot. A few radish seed sown with the asparagus will soon appear and mark the rows, so cultivation may begin at once. The radishes will be ready to pull before the asparagus plants will require the space. Soaking the seeds in warm water for twenty-four hours just before sowing will hasten germination.

The young plants must be kept free from grass and weeds, which can be done with a garden cultivator or a hoe, though hand weeding will likely be required around the plants.

Thinning out will be necessary to prevent crowding and weak plants. A pound of seed will produce many thousand plants, but as many will have to be thinned out and poor ones discarded, about 5,000 plants can be estimated from a pound of seed.

Top-dress the young plants with leunasalpeter or nitrate of soda at intervals during the growing season, spreading it lightly along and between the rows, being careful not to get it in direct contact with the plants.

Seed may also be sown in a hotbed or greenhouse in February or March, transplanting only the best plants into pots, when three inches high. Later shift into larger pots where good growth is made before setting them in the field.

Sowing Seed Where Plants Are to Remain.—In the autumn prepare the land by manuring, deep plowing and harrowing, making it level, smooth and finely pulverized. Set lines three feet apart and about an inch and a half deep, in which the seed is to be sown, using five or six pounds to the acre. Tread the seed down evenly with the feet in the rows before covering, then draw the soil over the rows and roll the whole surface.

The young asparagus will show in the rows as soon as the land is fit to work. Begin cultivating at once, keeping out all grass and weeds, loosening the soil and getting out the weeds between the plants and keep this up continuously. If the weeds get a start the crop will be lost. In about three months after starting, the plants will be of fair size and should be thinned out to stand nine inches apart in the rows.

As soon as the stems die down cut them off and cover the rows on each side with two or three inches of manure.

Keep the weeds down the second and third years, cultivating frequently.

The fourth year a good crop may be expected. The first year, a crop of lettuce, cabbage, onions, beets, spinach or some similar crop may be grown between the rows of asparagus.

Sowing the seed where the plants are to remain is not in favor with commercial growers.

Selecting Plants.—Strong, healthy one year plants are preferred to those two or three years old. The careful selection of strong plants is as important as the selection of good seed. A crown with four or five well developed buds is to be preferred to one with more but weaker buds. The roots should be strong and of uniform thickness. Discard plants with many bruised or damaged roots.

The pot method of starting plants permits careful inspection and selection of the plants. The Missouri Experiment Station recommends this system and states that seven-eighths of the seedlings should be discarded. Many that appear to be strong plants will have broad, flat, twisted and corrugated stems which should be discarded. Those putting out leaves close to the soil should likewise be discarded, as they will make tough, stringy, undesirable plants. Plants which are cylindrical, smooth and free from ridges, will shoot up rapidly and shoot up two inches before leaves are put out. In field propagation the selection should be made in the autumn, before the stems break down. If desired, the plants may be tied up in bundles of fifty and stored until spring. The plants can be stored by packing the bundles in barrels with slightly moist sand, sawdust, or preferably peat moss, and burying the barrels late in the autumn, first covering with straw or leaves and then adding a few inches of soil.

Male and Female Plants.—Male plants are approximately fifty per cent more productive than female. The shoots being larger, have a greater market value.

As has been explained, all the plants in a bed do not bear seeds, as the male and female flowers are usually borne on separate plants. Bearing seed always tends to exhaust the vitality of a plant.

The sex of the plants cannot be determined until the second season when the flowers are produced. The increased productiveness is believed to more than offset the disadvantages of transplanting two year old roots.

Few gardeners have taken the trouble to produce beds of male asparagus plants. A bed of male plants may be built up gradually. The plants can be propagated by divisions of the roots, but whether the plants will be as strong as plants grown from seeds, remains to be seen.

Preparing the Soil.—Asparagus thrives in sandy loam, but does well in any good garden soil. The land must be free from stones, roots or anything that will interfere with the spears working their way through to the surface, or with the knife in cutting. The bed should be fully exposed to the sun and not shaded by trees, the roots of which will take moisture or food from the soil. Cold, wet land is unsuitable. Freedom from weeds is essential.

A properly made asparagus bed will last for years and produce good crops, so it is important to start by thoroughly and carefully preparing the bed. The expense may be considerable, but considering the fact that it is to last for a long time, the expense divided over years will make the cost well worth while.

Plow the Land Deeply, but not so deep as to bring up infertile subsoil, doing the plowing the preceding autumn. Leave the land in the rough, plowed state over winter.

Where manure can be had reasonably, spread a liberal coating over the surface after plowing. As early in the spring as the land can be worked, plow again, harrow and work into a fine condition. It is important to have plenty of rotted vegetable matter in the soil where the asparagus bed is to be made.

Planting.—In the Northern States, spring is the best time to plant, as early as the ground can be prepared. The plants must be kept moist and protected from the wind and sun. A sure way to kill many of the plants is to drop them along the rows and leave them exposed for some time before they are covered with soil.

The distance apart to have the rows is somewhat a matter of preference. In small gardens where intensive methods are followed, the rows are made closer together. Where high ridging is to be practiced, more space will be required between rows. In New Jersey, the rows for white asparagus are from 5 to 5½ feet apart, with plants 2 feet apart in the row, the standard planting distance in the row. Green asparagus is set in rows 5 feet apart, while at Concord, Mass., the rows are usually 4 feet apart. Some plants are set as close as 3 feet apart.

Crowding the Plants tends to produce later and smaller crops of smaller-sized stalks and the beds will not last as long as those where the plants are given more room. Asparagus roots extend horizontally in all directions from 8 to 10 feet.

Deep Planting tends to produce large shoots and the crowns are safely below damage from tillage implements. The new buds form higher up on the crowns each year, so that deep planting prolongs the life of the bed.

Set the crowns from 8 to 10 inches deep, but the roots should not be set down in poor subsoil.

An ordinary plow may be used to make the trenches for setting the plants, throwing a furrow slice on each side of the trench, after which greater depth may be made with shovels. The roots should be set in the bottom of the trench, carefully spread out, over a mound of fine soil and not on hard earth. Cover with about three inches of fine soil, firming it well over the roots with the feet. Do not cover deeper until the shoots appear and then gradually work in the soil as the shoots grow, until the furrow is completely filled.

Green and White Asparagus.—When asparagus is given level cultivation and the stalks cut only a little below the surface, green asparagus is produced. As the stalks are smaller after they reach the light and air, it takes more stalks to make a bunch of green than of white asparagus. Green asparagus can be grown in rows closer together than white, as the soil is not needed for ridging, so the yield per acre may be equal in the number of bunches produced, though trouble with beetles may be greater with green asparagus.

Green asparagus has much more of a flavor than white and is generally preferred, although many prefer the white.

Good White Asparagus can only be grown in sandy soil which lends itself easily to high ridging, necessitating a growth of six to ten inches before the shoots reach the light. They are cut down deep under the ridges of soil.

Cultivation.—Tillage should begin very soon after planting. Lightly stirring the soil in the furrows will be sufficient at first. When the plants appear they should not be broken. Let cultivation continue throughout the season to keep down the weeds and to conserve moisture.

The disk harrow is used in the early spring in established fields, as soon as the land is sufficiently dry, and manure worked into the soil, if it is to be had, otherwise commercial fertilizer is used—or both. After harvest, manure or fertilizer is applied and the disk used again.

Only light and shallow cultivation should be given, so as not to break the roots of the plants, but this should be kept up sufficiently to keep the bed free from weeds. After the final cutting the bed becomes well shaded which keeps the weeds down.

Replacing Plants.—Some plants will die out and should be replaced in the spring. Go over the bed in the autumn and set a stake where there is a plant missing, so the plants may be set early the following spring. Keep a supply of roots in reserve for this purpose, on large operations.

Autumn Treatment.—In mild climates, as soon as the berries are turning red, cut over the bed, but not before the berries show a change of color from green to red. If the seed ripens it will drop and fill the bed with seedling plants. To cut sooner deprives the roots of natural development. Remove and burn the brush. In the North, the tops are left to give the plants winter protection.

Cutting may begin moderately the third year, but should not be severe, nor kept up for long.

Fertilizing.—Liberal fertilizing is necessary to obtain an early, abundant crop of high quality asparagus. There is no crop more certain to render a good account in yield, in return for liberal fertilizing. Some successful growers spend from $80 to $100 per acre for fertilizers.

Soon after the plants are set, give a dressing of 750 pounds of a 4-8-8 fertilizer, 4 per cent nitrate, 8 per cent acid phosphate and 8 per cent potash, applied along the rows, lightly raked in. About four weeks later give a dressing of leunasalpeter or nitrate of soda along the rows and work in very lightly. Following this, a dressing of manure can be given between the rows, if it is obtainable. This treatment should be repeated the second year.

After the second year, heavy applications of manure are given annually, ten tons or more to the acre, after the cutting season, applied between the rows, although some growers now use no manure at all, chiefly because it is unobtainable. It is advisable to keep the soil supplied with humus—decayed vegetable matter in some form.

Nitrogen is the most important element in fertilizing asparagus and this can be supplied in the form of organic material such as cotton seed meal, tankage, fish scrap or dried blood. With these a 4-8-8 fertilizer can be used and a little leunasalpeter or nitrate of soda. Some growers prefer a 6-8-10 fertilizer.

Various opinions are held regarding the best time to apply the fertilizer after the bed is established and growers will work out the plan best suited to their needs. First try early spring applications, followed by a similar application immediately after the last cutting, using a ton per acre of a 4-8-8 mixture at each application. Follow the first application with 100 pounds of leunasalpeter or 150 pounds of nitrate of soda, broadcast, as soon as growth starts. Make another similar application in the middle of the cutting season and still another application in about two weeks after applying the 4-8-8 mixture at the close of the cutting season. Experimenting, carefully watching results is advisable. It is possible on some soils to give more fertilizer than the plants can use, which is waste.

Not only is the present year's crop to be considered, but the plants must be conditioned for a good crop the following season.

Salt was formerly used as a fertilizer for asparagus. Asparagus is a native of salt marshes and will stand considerable salt, but can be injured by too much. The greatest value obtained from the salt was supposed to be in keeping down the weeds, but it is doubtful if salt does this. Leunasalpeter keeps the soil moist, and with it certainly no salt is required.

Harvesting.—Asparagus growers generally consider it a mistake to harvest a crop until the third year. Others take off small crops the second year and feel that the second year's crop is so much net profit. The third year, the cutting season extends not over three or four weeks. Eight to nine weeks is the cutting season in good beds and even longer when the season starts early. In the latitude of New York City cutting begins in April and continues until the middle of June and sometimes two to three weeks later. Stop cutting whenever the shoots show weakness, unless the bed is to be discontinued, in which case cutting can continue as long as the crop lasts.

Special knives are made for cutting and the length of the shoots cut is regulated by the length of the bunches marketed, the bunches varying from 7 to 11 or 12 inches long. The knife is pushed down and through the shoot the proper distance below the surface. White asparagus is cut as soon as the tips appear, while the green is cut at the surface or a few inches below. The cutting is done as often as the shoots are ready, once or twice a week in the early season, to once or twice a day at the height of the season.

If late cutting is done on Saturday, to save Sunday work, place the bunches in shallow trays of water until Monday morning.

In large beds the shoots are cut and laid in the rows to be gathered in baskets or trays by boys or girls closely following the cutters.

Marketing.—The shoots are washed before bunching, and graded into three sizes: extras, primes and seconds. The bunches vary in length, but are usually about five inches in diameter, varying from one to three dozen shoots, each bunch weighing about 2½ lbs. The bunches are formed in bunchers made for the purpose and are tied securely at top and bottom with raffia, but generally with red asparagus tape made for the purpose. The bunches, when stood in shallow trays of water, expand sufficiently to make them very tight.

Asparagus bunches should be packed in special crates made of a size so the bunches will just fill the crate and make an attractive appearance. For long shipments, damp moss should be placed in the bottom of the crates and the bunches packed so they will not move in the crate. Crates hold from 24 to 30 bunches.

Yields.—Fifteen hundred bunches per acre is a fair yield, although growers produce as high as 3,200 bunches in Massachusetts and as high as 3,000 are produced in New Jersey by some growers. Prices vary according to the quality and season. Extra quality in the early season brings high prices.

Age of Beds.—Asparagus beds 20 years old have been operated profitably. The age of a bed that may be worked profitably depends on the depth of planting and the care it receives thereafter. A well cared for and well fertilized bed should produce profitable crops for 15 years. When old beds produce small shoots, it is time to plow them up. A new bed should be started on another plot, at least three years before the old bed is to be plowed up, so there may be no break in the supply.

Interesting Report from a Successful Asparagus Grower.—C. E. Willett, Concord Junction, Mass., in 1924 had a gross income of over $3,000 per acre from three acres of asparagus, much of which was profit.

Mr. Willett says: "Don't select a wet piece of muck for asparagus. Get a dryish piece, a rich, sandy loam. I grow my own plants, starting the seed as early as the weather will permit in the spring, soaking the seed for a couple of days in warm water before planting. Be sure not to let the water get hot.

"The third year, I cut lightly. Wait until the fourth year and then you will get a good steady crop for 12 to 15 years. I get a new bed going the tenth year, so it will be ready by the time the first bed is twelve years old.

"I do not hill up. The market here likes green asparagus. We fertilize heavy. In the autumn, I spread manure three inches deep over the entire bed, so the plants are not subject to a lot of quick freezing and thawing—which is to be avoided. During the growing season I apply liquid manure. Remember that next year's grass depends on this year's cultivation and fertilization.

"We start cutting the first of May and end around the middle of June."

Asparagus Varieties.—Pedigreed Washington, which was developed by the U. S. Department of Agriculture, is rust-resistant, vigorous and of good quality. The shoots are large, straight, dark green, shaded with purple. It is one of the best for market gardens or home use.

Palmetto is a popular variety with commercial growers. It is prolific, producing shoots of good quality and is quite rust resistant. Leads all other varieties in the South.

Conover's Colossal is an old favorite. Tender and of good quality.

Barr's Mammoth is a favorite with growers for the Philadelphia market.

Argenteuil is a French variety quite largely grown here, but it does not give good results on soil containing clay or silt.

Insects.—The asparagus beetle is the most troublesome asparagus insect. The larvae and beetles feed on the shoots. They also feed on stems and leaves which reduces the vitality of the plants.

The beetles winter under the shelter of weeds and old plants and lay eggs in April or May on leaves or stems, which produce the first brood. The larvae appear in from three to eight days and attain full growth in from ten to fourteen days. The beetle is only about a quarter of an inch long, blue black in color, with red thorax and lemon-yellow and dark blue wing coverts, with reddish border. Two or three broods are produced in a season.

Arsenate of lead is used for the larvae and beetles on young plants and in old plantations, after the cutting season.

When the shoots are cut daily and there are no other plants near by, the eggs are destroyed when the stalks are cut and prepared for market. Chickens and ducks in the field will feed on the beetles and larvae. Fresh air-slaked lime kills the larvae and if they are brushed to the ground in hot weather they die before they can get back on the plants.

The "twelve-spotted asparagus beetle" is controlled in the same manner as the asparagus beetle.

The "asparagus-miner" mines under the skin, near or just beneath the base of the plant. The remedy is to permit a few plants to grow as traps to lure the female to deposit her eggs. Late in June or early July the trap plants are pulled and burned.

Rust is indicated by an unusually early maturing of the plants. The skin will be lifted as if blistered. Small reddish-yellow spots appear on the main stem and branches. Mowing and burning the tops every autumn after they become brown, but before they become brittle, is recommended. The disease weakens the plants during summer, after the cutting season.

This disease is most pronounced in seasons of drought and irrigation will reduce the trouble. No perfect control measures have been found.

The Washington variety is least susceptible to this trouble and is generally considered rust proof.

BEANS

Beans are of Two Types.—Bush and Pole.

The Bush beans include the Lima and the Kidney in both the wax and green podded.

Field beans include the Pole or Corn-hill in colored and white varieties and Bush beans including the white and colored Kidney, the white and colored Marrow, and white and colored Pea beans.

Snap and String beans are eaten with the pod. Stringless varieties now have taken the place of String beans.

Green-shell beans are shelled and used before fully ripe or allowed to ripen before cooking. They may be permitted to mature for use as dry beans.

Beans are produced on a large scale for canning and for shell beans.

Beans as Soil Improvers.—The bean is a legume, a plant which gathers nitrogen from the air and fixes it in the soil through the roots of the plants. When a crop of beans is harvested, not only is the crop gained but the soil will be richer in nitrogen. The greatest benefit to the soil is obtained when the entire crop is turned under as is sometimes practiced with soybeans.

The bean is a good crop for inter-cropping, growing between rows of other plants.

The nitrogen on the roots will be observed in the form of nodules or small balls on the roots of the beans. Successive cropping increases the number of nodules and the yield. Near Freehold, N. J., hundreds of acres of beans have been grown for years on the same land for canning factories. The fields of beans are on both sides of the road and extend farther than one can see.

Cultural Requirements.—The bean is a semi-tropical plant and susceptible to injury by frost and decay if planted when the soil is wet and cold. The English Broad Bean is more hardy and will stand some frost. Hot, dry weather sometimes blasts the flowers.

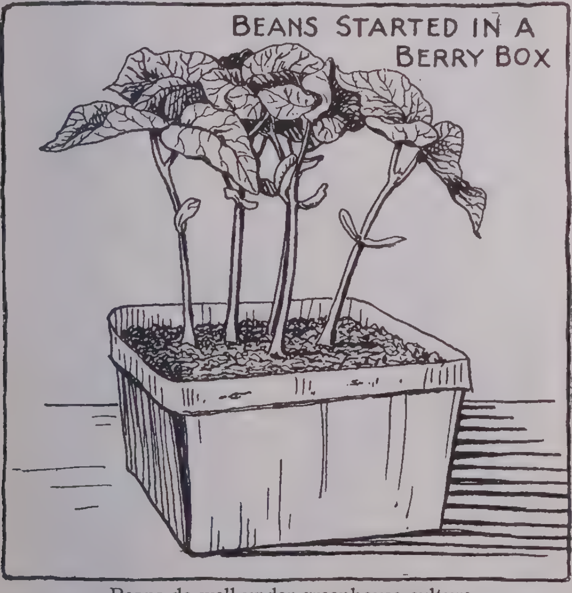
Bush beans are more hardy and may be planted earlier than the pole varieties. Limas are tender and require a long growing season, while snap beans are ready in from six to eight weeks.

Lima beans are sometimes started in hotbeds or greenhouses about three weeks before they are to be set out in the open ground. Clay or paper pots are used filled with light rich soil and three or four beans planted in each pot. In setting in the garden, the roots are disturbed as little as possible. This method gains fully two weeks over field planting.

BUSH BEANS (DWARF)

Soil.—Beans will grow on poor soil but do best on moderately light, well-drained soil. Plenty of organic matter and high fertility are necessary to obtain large yields. Limas prefer sandy soils while clay loams are best for field crops. Lime or ground limestone used freely on the soil will help production. Muck soils produce excessive plant growth and small yields of beans.

The seed bed should be well prepared and made fine.


BEANS STARTED IN A BERRY BOX

Beans do well under greenhouse culture

Planting.—Early planting is not advisable for beans as the seed will rot if the soil is cold and wet, while if they grow when planted early the plants may be injured by late frosts. Cold, damp weather stunts the plants, causing an uneven growth.

POLE BEANS (OLD HOMESTEAD)

Plants started early are more susceptible to rust than those started later and under more favorable circumstances. Do not begin planting beans until the soil is warm. Kidney beans may be planted earliest, following with the marrows and finally the pea varieties. Subsequent plantings at intervals of two weeks may be made if a continuous supply of snap beans is desired.

The depth of planting varies from one to three inches according to the kind of soil. Three inches is not too deep for light soil.

The dwarfs are usually planted in rows from two to two and a half feet apart and from two to six inches apart in the rows. For hand or wheel hoe cultivation the rows may be from sixteen to eighteen inches apart. The climbers are planted in hills of four or five seeds each, three to four feet apart each way and supplied with poles eight to ten feet in length for each hill. Of the larger varieties only two plants are allowed to grow in a hill, but usually three or four plants remain.

Earliness is important in dwarf snap and shell beans on account of good prices which the early crop generally brings, so growers often take the risk of making an early start although the first planting may be lost through cold weather. If the crop comes through, the profit will be good. Sometimes, even though the crop may be damaged, the remaining plants may be sufficient to pay. June 1 to 15 is the planting season in the bean belt of Western New York.

Cultivation.—Do not permit the crust to remain in a baked condition over the seeds. After rains, break the crust with a weeder. This may destroy some plants but if the stand is good, this is of no consequence. If the work is done in the middle of the day there will be less damage than otherwise.

Weeds must be kept under control and moisture conserved by shallow tillage. The roots of the plants are close to the surface and deep tillage will be injurious. Never cultivate or disturb the plants when they are wet with dew or rain, as this causes anthracnose. Later in the season cultivate shallow and infrequently or just enough to control weed growth and prevent the surface from crusting.

Fertilizing.—Beans are nitrogen-gathering plants and relatively small amount of nitrogen is required. For this reason stable manure is not used in large quantities as too much nitrogen causes excessive plant growth and decrease in pods. Beans however need a soil containing ample organic matter and for this purpose green manures are used, that is, green crops turned under.

Relatively large amounts of phosphorus are desirable for the production of good yields of beans. A good general fertilizer for beans is a 2-8-6,—two per cent. nitrogen, eight per cent. acid phosphate and six per cent. potash. On sandy soils, a 5-10-6 mixture is used at the rate of 800 pounds to the acre. Where stable manure is used in the rotation, some use only acid phosphate. Where the soil requirements are definitely known (which is very rarely the case), this formula may be changed to meet the actual soil requirements. For hastening the development of a crop belated by unfavorable weather, applications of from twenty-five to fifty pounds of nitrate of soda are sometimes made, or a third less of leunasalpeter when the plants are established. Care must be used not to get the fertilizer on the foliage and it should be lightly worked into the top soil at once. Fertilizers for beans are usually applied broadcast before planting.

Ground limestone is used with good results on beans, or, lime applied several weeks before the fertilizer.

Selecting Seed.—The use of high grade seed is important. See that the seed is sound, fresh, and uniform in appearance and of good germination.

In saving seed for planting, select pods from the most vigorous and the most productive plants which are entirely free from disease.

Supports.—Poles, if kept out of the weather and in a dry place when not in use will last for several years.

Rotation.—Beans mature rather quickly and so are frequently used as a catch crop, utilizing the land on which a crop has been harvested, such as potatoes, lettuce or radishes and which are out of the way by the time the soil is real warm. In the South, snap beans follow spinach or kale and the beans are followed by autumn crops.

Harvesting.—Garden beans are picked by hand; the pickers are generally paid by the basket. Field beans are harvested by a machine made for the purpose. Harvesting is done before the lower pods get dry and shatter. The plants are piled in the field and allowed to cure for a few days. If the weather is wet the piles are frequently turned to prevent damage to the crop. After curing, the crop is stored in barns and later threshed.

Beans are threshed with a machine made for the purpose that is somewhat similar to a grain thresher. The flail is used where only small quantities are threshed.

In California a combined harvester and thresher is used on large plantations.

WAX BEANS (REFUGEE)

Yield.—The average yield of field beans in the United States in 1900 was $11^1/_5$ bushels per acre, although some growers average double this figure. The price range is around $1.50 to $2.00 per bushel. Snap beans should produce two hundred bushels to the acre. Prices vary. Some years, in a bad market, the crop may show a loss. One hundred dollars an acre is not an unusual average profit.

Marketing.—String or snap beans are sorted, to remove the damaged and broken pods, by those who market quality produce. Hampers of different kinds are used in different markets. Green shelled beans are generally marketed in berry baskets. Green shelled limas are usually in good demand. Beans shipped to a distance in warm weather are shipped in refrigerator cars.

Forcing Beans.—The bean does well under greenhouse culture, but the profits from the operation have not encouraged general adoption of the plan. Forced beans are very delicious and a market may develop for them. In England beans are a profitable greenhouse crop. The facilities for shipping early crops from Florida to the North and from California to the East, create conditions here, quite unlike England.

The first crop may be started under glass in September or October and by successive sowings, two weeks apart, continuous pickings can be made until the following summer. March first or soon thereafter is the customary planting time in this country, when there is the ample sunshine that is needed for rapid development of the plants.

The soil in the benches should be six inches deep with the heating pipes below the benches, to give plenty of needed bottom heat, without which the plants will not thrive. If the seed is not planted until spring, the earth beds of the greenhouse may be used, providing there is no shade.

Both the Bush and Pole Sorts Are Used for Forcing.—The plants must make a rapid growth. Two of the best varieties for forcing are Masterpiece, an English variety, obtainable here, and Wonder. Masterpiece is a quick, prolific variety, with pods about seven inches long, straight, tender and stringless.

Of American bush beans Black Valentine and Long Yellow Six Weeks are used.

Of the English varieties, Canadian Wonder and Ne Plus Ultra in the dwarf; and Princess of Wales and Earliest of All in the climbing sorts are good.

The pole varieties are supported by twine or trellises or light stakes.

Bush beans are planted from ten to fifteen inches apart, in rows eighteen inches apart, two to three beans at each place.

Beans may be grown in pots, starting in small pots and shifting to larger when the pots become filled with roots.

Beans require practically the same cultural conditions under glass as the cucumber. The temperature should be kept at 70 to 80 degrees during the day and not below 65 at night. The soil must be kept damp and the atmosphere dry when the plants are in flower, to enable pollination to take place.

Two to three pickings is all that can be made from greenhouse crops.

The red spider, aphis and white fly are the pests that trouble beans in the greenhouse.

Beans are sometimes grown in cold frames in the spring. Glass or cloth covering is used for protection for about a month.

Bush beans can be planted between rows of lettuce, after the lettuce crop is well along. After the lettuce is out of the way, the ground is fully occupied by the beans.

Varieties.—Some varieties are sold under different names by different seedsmen. Kentucky Wonder Wax, for example, is offered as Prosperity, Wonderful, Texas Prolific Wax, Old Homestead, Ohio Wax Pole, etc.

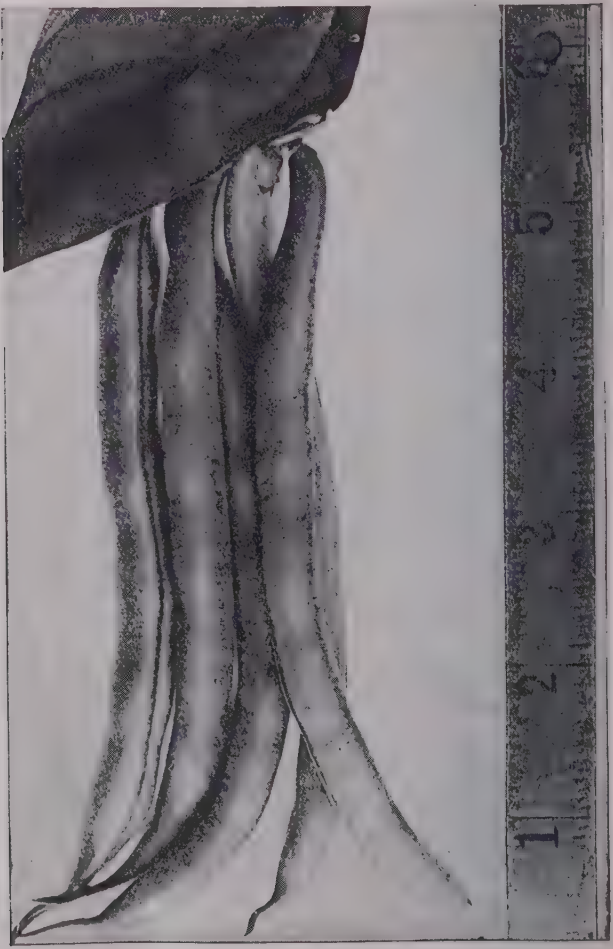
Only the leading varieties can be given here:—

Dwarf Wax Podded Beans

Burpee's Kidney Wax.—Long, flat, yellow pods of good quality. Early and productive.

Improved Golden Wax, also sold under various names such as Improved Rustless Golden Wax, Rust-Proof Golden Wax, etc. Productive, early, strong grower. Pods are oval-flat, yellow, stringless, of good quality.

Pencil Pod Black Wax.—Best of the black wax. Good for home or market. Long bearing season.



SCOTIA BEANS

Wardwell Kidney Wax.—A favorite for a quarter of a century. Large, flat yellow pods. Early and of high quality. Stringless and brittle.

Sure Crop Wax.—Stringless; productive; long season. Robust plants hold the pods up from the earth thus protecting them from dampness and dirt. Large, attractive pods. An improvement on Currie's Rust Proof. Unusually free from rust.

Dwarf Green Podded Beans

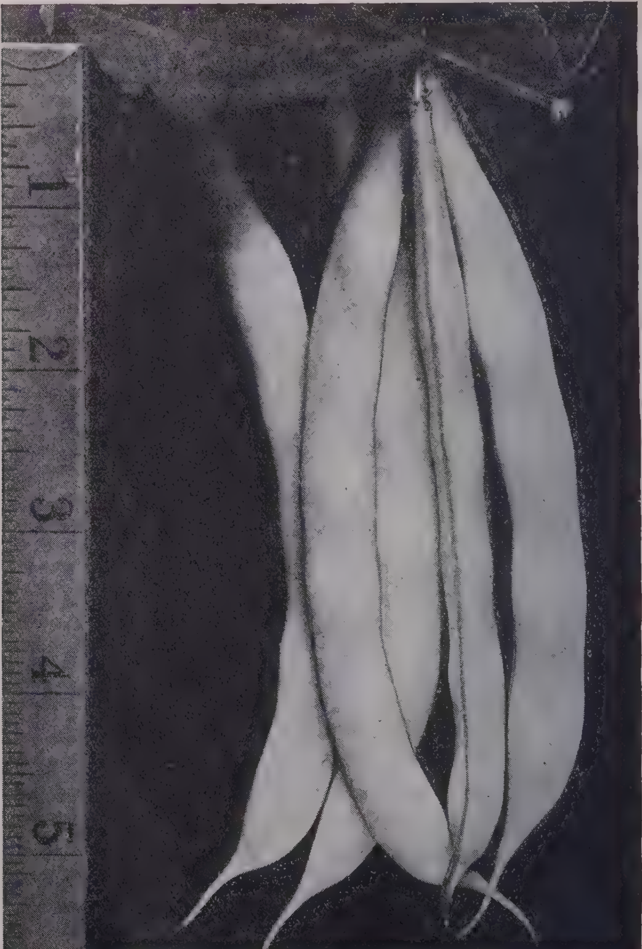
Improved Stringless Green Pod.—Vigorous plants hold the pods well off the ground. Pods remain crisp and tender a long time. Early and productive.

Refugee or "1000 to 1." An old variety. Vigorous and productive; largely used for canning. Light green pods of good quality when young. Matures late.

Black Valentine is popular in the South. Early and prolific. This has been a profitable market variety, but it is not of high quality.

Red Valentine.—Green pods produced in large clusters. Good shipper. Used extensively for canning, pickling and commercial purposes.

Bountiful.—The best flat-podded stringless. Light green pods, 6 to 7 inches long; stringless; good quality. Early, productive, bearing for a long time.



WAX BEANS (WEBBER)

Green Shell Beans

Dwarf Horticultural.—One of the best early dwarf varieties for green shell beans. Can be used early as a green snap bean.

Wax Podded Pole Beans.—Kentucky Wonder or Old Homestead. Sold under many names. The best early green podded pole bean. Fine flavor, vigorous and productive. Pods 7 to 10 inches long. Stringless. Seeds sown with early bush beans will yield about the time the bush beans are through bearing.

Creasback or Best of All, etc.—Early, productive. Fine quality if gathered when young.

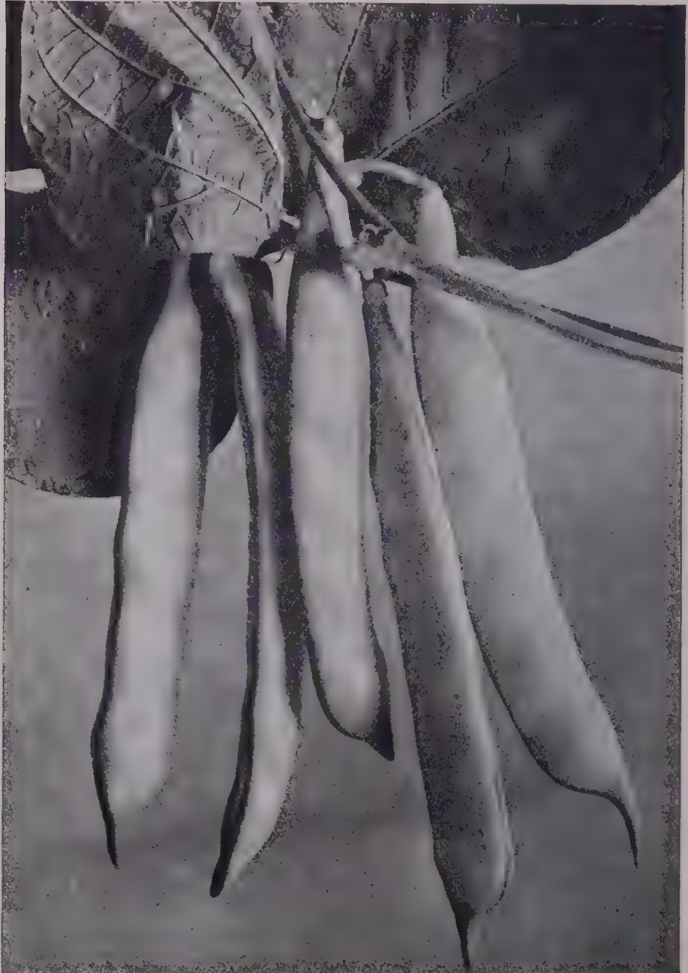
Lazy Wife.—Late variety. Good as snap or shelled. Pods thick, meaty and of good flavor.

Scotia.—Tender and delicious. Stringless. Long, round pods, straight, light green. Prolific bearers. Begin bearing after early bush beans. If kept picked will bear through August and September. Excellent for canning.

Bush Lima Beans

Bush Lima Beans are hardier than the pole limas and may be planted somewhat earlier. About the time the maple trees unfold their leaves is usually about right. Plant with the eye down. The two halves of the lima bean become its seed leaves and should be placed in a position so the halves of the seed can push through the soil easily. In large plantings this idea cannot be utilized.

Henderson's Bush Lima is the small type of lima and is grown by those who prefer the small bean. It is productive, bearing throughout the season.



WAX BEANS (GOLDEN)

Burpee's Improved Bush Lima is a strong grower, keeping the pods well off the ground which avoids rust and rot. Excellent flavor. Sells well in the market.

Pole Beans

Pole Lima Beans.—King of the Garden is an old favorite. A good general purpose bean. Vigorous grower. Four to five large, white beans to the pod.

Early Leviathan.—The earliest pole variety. Good quality. Four to five long beans to the pod. Good for home or market.

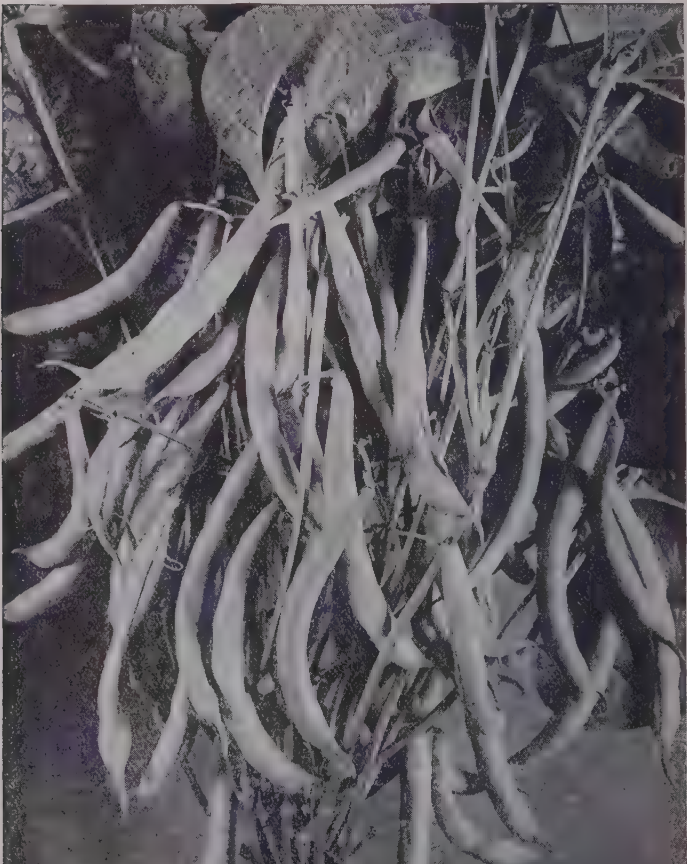
Field Beans

There are four types of field beans: kidney, marrow, medium and pea.

In the Kidney Type, White Kidney is an excellent cooker. **Wells' Rust Resistant.** Large size; prolific on good soil. **Imperial or Prolific Tree Bean,** smaller than White Kidney. Strong grower, heavy yielder. The best for baking.

In the Marrow Type, Boston Marrow or White Marrowfat.—A large plump, white bean of good quality. Productive on good soil. **Yellow Eye,** a medium size bean, white with yellow spot or eye. Largely used for baking. Good yielder; matures early. Less subject to disease than some sorts. In the marrow class, also, Marrow Pea or White Navy; vigorous and prolific, small white round beans of excellent quality. This variety is more largely grown than others as a field crop for market.

Robust Pea Bean is an improved strain of Marrow Pea, which resists the mosaic disease. Heavier yielder than the Marrow, otherwise the beans are the same.



BLACK BEANS (VALENTINE)

Broad Bean.—The English broad bean is hardier than other beans and requires a moderately rich, cool, heavy loam and cool exposure. Our summers are too hot for its best development. Northern winters are too cold for this bean to survive the weather when planted in the autumn as it is in parts of Europe. Some sections of the country may permit this. The seed may be started under glass early and transplanted when safe to set out. Some gardeners plant them in the open ground before it is safe to plant other beans and get good results.

Insects.—The bean has a number of insect enemies, but the weevil is the most destructive. The remedy is treatment of the seed before planting, by fumigating with bisulphide of carbon. Use a kerosene oil barrel which has been well dried out. The barrel will hold about five bushels of beans. Pour three ounces of bisulphide of carbon of the best quality over the beans and close the top tightly. Leave for 48 hours.

The vapor of this substance is very inflammable and the work should be done away from buildings and no light nor even a spark should be brought anywhere near it.

Bean Leaf Beetle.—The beetles eat holes in the leaves from the underside. Eggs are laid at the base of the plant and the grubs feed on the roots and stem below the surface. Spray with arsenate of lead, 2 lbs. of powder to 50 gallons of water, covering both sides of the leaves.

Diseases.—Anthracnose is the most common of bean diseases. Both this and mosaic may be avoided by using only healthy seed in healthy soil. Seed selection should be given **very careful** attention by every grower. Hand pick all seed, if this has not been done by the seedsman, and use no seed showing the slightest discoloration. Do not walk through or pick beans when wet with rain or dew.

Rust is not serious in many sections. It is in the South

Anthracnose is frequently called rust. Rust resistant varieties of beans are offered, meaning that they are resistant to anthracnose. Rust attacks the leaves, which turn yellow and dry up.

The remedy is the use of rust resistant varieties which are, for dry shell beans: Dwarf Horticultural and Red Kidney, White Marrow and White Kidney. For pole beans: Horticultural Pole, Lazy Wife, and Mont d'Or. For green pod beans: Black Valentine, Burpee's Stringless, Hodson, Champion. Warren and Refugee. For wax pod: New Pearl and Pencil Pod,

Soybean.—Soybeans are grown for green manure and turned under to add vegetable matter to the soil. They are also grown for forage for stock, for human food and for oil. The soybean is becoming an important crop in this country as it has been in Asia, India and Japan for ages.

Meal or flour is made from the dried beans. They are cooked in various ways for human food and used green. The dried cake from which the oil has been compressed is used for stock feed and as a fertilizer. The crop is handled the same as cowpeas.

Cowpeas.—The cowpea is not a pea but a bean. Naturally in looking for cowpeas, one will expect to find it under the classification of peas, so it has been given there.

BEETS

Beet.—Sandy loams or light soils are best suited for this crop, especially where earliness is of importance. Heavy soils must be lightened and the expense of this operation should be considered where commercial growing is the object. Good drainage is necessary. In heavy soils, beets will not be of uniform shape.

OVERHEAD FIELD IRRIGATION OF BEETS. U.S. DEPT. OF AGRICULTURE

The irrigation pipes are built high so that they do not interfere with the field workers

Heavy soil can be lightened in several ways: by turning under clover sod or green manures, or by heavy applications of stable manure.

The beet flourishes in cool climates. In the South it is an early spring crop. The leaves are used for greens and the

DARK RED BEET

roots for cooking and pickling. The crop should be harvested before freezing weather.

Types.—The common types are the garden beet, sugar beet, mangel wurzel or mangel and Swiss chard, the leaves of which are used for greens.

Seed.—Some gardeners grow their own beet seed. The beet is a biennial and to produce seed the roots are stored over winter and planted the following spring, in rows three feet or more apart and two feet apart in the rows. The plants grow three to four feet tall, with many branches.

What is generally considered a beet seed, is not really a seed, but a fruit and contains several seeds, so a "seed" may produce several plants. For this reason beet seed should be sown very thinly. When planted, sufficient moisture must be supplied continuously to soften the shell and insure germination.

Seed Bed.—The seed bed for beets should be very carefully prepared.

On land that is at all heavy, autumn plowing may be advisable, replowing again in the spring. Disk and smoothing harrows should be used to make the soil thoroughly fine so it will retain moisture, to insure prompt germination and development.

Early varieties are sown as soon as the seed bed can be ready in the spring, and while considered fairly hardy, early plantings often suffer from frost.

When the plants are too thick, they are thinned and used as greens.

Cooked, the young plants are excellent either plain or flavored with a little vinegar.

Transplanting.—Beets do not transplant well, but gardeners do reset the thinned plants. Some start the seeds under glass about five weeks before the young plants will be wanted, transplanting the seedling in the open ground. To transplant successfully, the soil should be moist, the weather cloudy, so the plants can pick up before the weather is bright.

From six to eight weeks are required for the roots to develop from seed to a salable size of the oval and turnip-formed beets.

Successive plantings can be made until the first of August, and somewhat later where the climate is equal to that of Central New Jersey.

The Long and Half-long Varieties require nearly five months to mature and for that reason are generally unprofitable crops for market growers. The oval and turnip-formed varieties can be developed on land that has been cleared of an early crop.

Where the Cultivation is to be done with wheel hoes, twelve inches between rows is sufficient and this is varied according to conditions, up to sixteen inches. Horse cultivation requires from twenty-four to thirty inches.

The Distance of the Plants in the Rows depends upon the variety and the size the roots are to attain before marketing. The distance varies from two to three, and from five to six inches.

Shallow cultivation should be given throughout the growing season.

Ten Seeds to the Foot of Row equals about one ounce to seventy-five to one hundred feet of drill, covered with an inch of soil and well firmed. As beet seeds germinate slowly, radish seeds are sometimes planted with them. The radish seeds come up quickly, marking the rows for early cultivation.

Fertilizer.—Beets must mature rapidly to be of good quality, and therefore a rich soil is necessary. High grade fertilizer is used at the rate of a half ton to a ton per acre, with later applications of nitrate, preferably in the form of leunasalpeter.

Marketing.—The early market generally brings the highest price, so it is desirable to market the crop as soon as possible.

Market requirements vary in different localities.

Beets are tied in bunches of a size to meet the demand. Some places take as small as a bunch of three, others require as many as nine or ten beets. The bunches should be well washed.

In light soils the beets may be pulled. In heavy soils they should be dug. The yield is frequently four hundred bushels per acre.

Storing.—Burying the roots in outdoor pits is a common method of storing beets. They are also stored in cellars, covered with damp sand.

Varieties.—**Crosby's Egyptian** is extensively grown. It is an early blood turnip variety. A good strain of this beet should produce short tops and dark blood-red flesh. It is sweet and tender, good for table use or canning.

Detroit Dark Red is popular and probably the best canning beet. Round, smooth, dark red. Tender and sweet. Later than Crosby's Egyptian.

Early Wonder is the earliest for bunching purposes. It is a selected strain of Egyptian. Globular, deep blood-red, uniform in size. Matures two weeks earlier than any other. Largely used for late autumn sowing. Crop matures evenly and may be harvested at one time.

Eclipse.—An old favorite. Early, round, deep red; good quality.

Insects.—Beets are comparatively free from insect pests, although many insects attack this vegetable at times. Flea beetles are the most troublesome and are held in check by the use of Bordeaux spray or Paris green or arsenate of lead.

Diseases.—Beets are subject to attacks of potato scab when planted in soil in which this fungus is established. Planting on disease-free soil is the remedy.

BROCCOLI

Broccoli is a profitable crop where it can be grown successfully and where there is a good market for it. It is almost unknown in some localities. As the plants are affected unfavorably by heat, this vegetable thrives best in the North. A deep, rich soil retentive of moisture is necessary. A constant and liberal supply of water is required to insure success.

The seed is sown in the open ground in May and the seedlings transplanted when five or six weeks old, in rows about three feet apart and eighteen inches apart in the rows. The leaves are tied over the heads as with cauliflower.

Varieties.—Large White French is vigorous, hardy and easily grown. The heads are white, compact and firm.

St. Valentine is a variety quite widely grown. Large, solid, white heads, which keep long.

Italian Green Sprouting is sown in frames early in the spring and marketed in June and July.

BRUSSELS SPROUTS

Brussels Sprouts, like Broccoli, is a variation of the cabbage, but instead of one large, single head on top of the stem, a small head appears in the axil of each leaf, arranged along the long stem which bears a cluster of large leaves on top.

The small heads, which are miniature cabbage heads, are cooked in the same way as cauliflower and cabbage and are sometimes pickled.

Brussels sprouts are a fine table vegetable, steadily growing in popularity. This crop has been grown around Brussels, Belgium, for hundreds of years and receives its name from that place.

Culture.—The culture of Brussels sprouts is about the same as for cauliflower. The plants stand considerable freezing and may be left out until severe freezing weather is expected.

For a late crop, the seed is sown in the open ground in a well prepared bed, during May, transplanting in about six weeks. Successive sowings may be made.

The main supply of sprouts in the New York market is grown in Suffolk County, Long Island. Here the plants are set out in June for the early crop and for the later crop from the middle of July to the middle of August. The rows are spaced three feet apart, to allow sufficient space for cultivation, and the plants, two to three feet apart in the rows. In sections of New Jersey the plants are set eighteen inches apart.

The Fertilizer Application for sprouts is about the same as for cauliflower.

Various fertilizers are used ranging from 4-8-4 up to a 6-8-5 mixture, that is, nitrogen, phosphoric acid and potash. Cover crops, chiefly rye, are used to supply humus.

The Small Heads Form in about three months after the plants are set. When the leaves along the stalk are cut off to improve the development of the sprouts.

Early sprouts are picked over several times and the lowest sprouts taken. If left, these open, turn yellow and are unfit for use.

The First Picking is made as soon as the lower leaves begin to turn yellow. The leaf below the sprout is broken off and the sprout broken off. New leaves appear above and in the axil of each, a sprout develops.

Sprouts Are Marketed in quart berry baskets and sometimes in two quart baskets.

About the time freezing weather sets in the plants are pulled and stacked by standing upright on the ground in a sheltered place, close together. A light covering of straw or marsh hay is thrown over them. Sprouts are not injured by light freezing, if thawed gradually, but repeated freezing and thawing will spoil them.

After stacking, the sprouts are cut off as wanted, stripped of the outer leaves, and sent to market.

Sprout plants can be stored in a cave cellar in winter and when the weather is mild, they can be left in the ground.

Varieties.—Paris Market. Half dwarf, having good sized heads. Long Island Improved. Dwarf, compact and hardy. Danish Prize or Danish Improved.

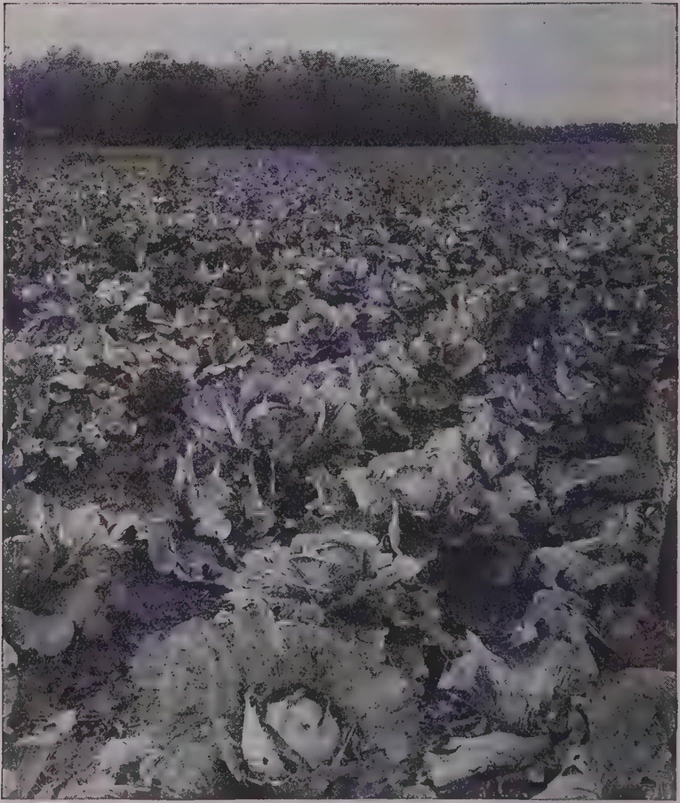
One ounce of seed will sow 200 feet of row and produce about 3,000 plants.

CABBAGE

Cabbage (Brassica oleracea capitata), one of the cole crops, which include cabbage, cauliflower, broccoli, Brussels sprouts, kohl-rabi and Chinese cabbage. It is one of the oldest edible vegetables. Records of its use date back to 2500 B.C. There are many different varieties.

Cabbage belongs to the cruciferae or mustard family, which embraces not only the cabbage but cauliflower, Brussels sprouts, kohlrabi, kale, mustard, water cress, cress, sea kale, radish, turnip, rutabaga and horse radish.

Varieties of Cabbage.—Gardeners and cataloguers refer to varieties as **early, medium** and **late.** The time of maturity, however, depends largely upon when the crop is started. Some varieties classed as "early" are started from seed sown



CABBAGE FIELD

in July, the crop maturing in October or later. A medium or mid-season variety may be started early under glass and the crop mature early in July.

Well Known Varieties to indicate groups have been suggested as follows:—

1. Wakefield and Winningstadt group;
2. Flat Dutch or Drumhead group;
3. Savoy group;
4. Red cabbage group;
5. Danish ballhead group;
6. Alpha group;
7. Copenhagen market group;
8. Volga group.

The Wakefield and Winningstadt Group includes varieties having small pointed heads. Jersey Wakefield is an old standard variety of this class. It is still one of the best early varieties. There are various strains of this variety sold under different names. Early Gem and Charleston Wakefield are types.

Winningstadt has more pointed heads than Wakefield. A favorite in home gardens, as every plant is quite sure to head. Lacks shipping qualities and is only used for market under favorable local conditions.

Flat Dutch or Drumhead Group is distinguished by the flat heads which are large and solid. Plants medium to large. Early spring is largely used for first crop for markets demanding flat cabbage early in the season. All Head Early is the largest; solid, uniform heads. **Succession** is considered by many to be the best cabbage grown and the plants are sure to head in moderately fertile soil. Used for spring, summer and autumn planting. Stands drought and is a good keeper.

Surehead is a popular variety with market gardeners, owing to its being quite sure to head. Cabbages weighing from 10 to 15 pounds are not unusual in this variety. Of fine texture and sweet.

There are two Flat Dutch varieties, early and late. The Early Flat Dutch is a large, solid cabbage; heads well. Premium Flat Dutch is an old standard large-heading sort. Seed may be sown in the open ground and plants raised without the use of glass. Large, solid heads of fine quality.

The Savoy Group includes the varieties having foliage very much wrinkled. The quality is considered superior to others, but this variety is not in demand generally, in market. The most important varieties are Savoy, Perfection Savoy and Drumhead Savoy. These sorts thrive best during the cool weather of autumn.

The Red Cabbage Group is distinguished by its deep purple-red color. Red cabbage is of splendid flavor when properly cooked. It is used largely by Europeans or their descendants in this country. Americans have been somewhat slow to learn the value of red cabbage. Danish Stonehead is a heavy, hard heading variety. Mammoth Rock Red is a standard late variety, producing solid heads weighing 10 pounds under good cultivation. Dark red, sure header.

Danish Ballhead Group.—The Danish Ballhead is generally grown for winter use on account of its superior keeping qualities. It has no equal for storing or burying. The heads are round, hard and solid, ranging from 3 to 9 pounds. Not adapted to sandy soil or warm climate. Early planting is necessary to obtain a full crop.

Danish Roundhead is a good keeper. Large, round, hard heavy heads. Earlier than Ballhead and has shorter stems. Danish Ballhead has longer stems than Roundhead, smaller heads and is two weeks later.

CABBAGE (DRUMHEAD)

Alpha Group includes the earliest varieties. Small, round heads which may be planted close together. Of no commercial importance. Requires rich soil. Good for intercropping with other vegetables. St. John Day and Miniature Marrow are the best varieties.

Copenhagen Market Group includes the variety Copenhagen Market. It is almost as early as Jersey Wakefield and the heads are larger, rounder and compact, with a short stem. An important early variety which is also used for medium or mid-season and early autumn crops.

Volga Group.—Volga is the only variety in this group. Conical, roundish heads of medium size.

"Disease Resistant Group" might well be added to the other eighty groups above given. A disease called "yellows" by the commercial growers has, in some sections of the country, caused the destruction of large acreages of cabbages. Varieties of cabbage have been bred which are **disease resistant** and practically immune from attacks of the "yellows" disease, but not from other diseases. **All Seasons** is an early or kraut variety, bred from "All Seasons Wisconsin No. 8," a late winter keeper. **Bugner's Disease-Resistant**, a round, late sort of medium size, heavy, hard-headed, is a variety. **Red Cabbage** is a "yellows" resistant red variety.

All the Cole Crops, Broccoli, Brussels sprouts, cabbage, collard, cauliflower, kale and kohl-rabi, thrive in a cool, moist climate, particularly cabbage, and it is therefore an important crop in the North. In the South it is grown in the cool weather of late winter or early spring.

Soils.—Cabbage is grown successfully on a wide range of soils, ranging from light sand and mucks to heavy clay. Constant moisture, good drainage and fertile soil are necessary. For early crops sand or sandy loams are best. For late crops with heavy yields, clay loams are best, and good muck soil produces good crops of late cabbage.

Soil Preparation.—For early cabbage, autumn plowing is the custom. Harrowing is followed as soon as the ground is sufficiently dry in the spring and this is repeated as often as necessary to get the land in condition for planting and to retain moisture. In the South where cabbage is planted in the autumn or winter, summer or autumn plowing is the rule.

CABBAGE FIELD
Showing trees which form a windbreak

For late crops in the North, spring plowing is desirable, harrowing often enough to keep down the weeds and to conserve moisture to insure successful transplanting.

Cabbage is composed of more than ninety per cent water, so the importance of an ample water supply can easily be understood.

Fertilizers.—Fifteen tons to the acre is not an unusual crop of cabbage. In producing this heavy tonnage a great quantity of fertilizing material is taken from the soil, also an immense amount of humus or organic matter is consumed. Unless this is replaced in the soil in the way of fertilizers and organic matter, good crops cannot be produced continually.

Stable manures are the best for cabbage and where they can be obtained may be used almost without limit. Ten to twenty tons to the acre is a common application and double this quantity will not be too much, supplemented with from 500 to 700 pounds of acid phosphate. Where manure cannot be had, green crops turned under should form the organic matter, supplemented by 800 pounds of acid phosphate, 100 pounds of muriate of potash and 300 pounds of nitrate of soda or 180 pounds of leunasalpeter, or the equivalent, per acre.

Market gardeners use a ton or more of high grade fertilizer per acre.

Sowing.—In the South the seed is sown in the open ground in October and the plants set in the fields in about eight weeks. They are also wintered in the beds and protected where necessary, setting out in the field early in the spring.

Some gardeners in the North sow the seed in the open early in September and transplant into cold frames late in October. Others sow in cool greenhouses in September, transplanting into flats where the plants are held over winter, in a low temperature.

For later crops, seeds are sown in hotbeds or cold frames about March 1 and transplanted to the field.

The more common method is to sow in hotbeds or greenhouses in January or February, transplanting the seedlings 1½ to 2 inches apart each way.

CABBAGE (LATE FLAT DUTCH)

Plants for late crops in the North are grown in the open. The seed bed should be near the field to be planted.

The soil for the seed bed should be very carefully prepared. Heavy fertilization of the seed bed should be avoided as this will produce too rapid growth, resulting in weak, spindly plants. Strong, stocky plants only are wanted. The seed bed should be well supplied with moisture at the time of sowing.

The sowings are made during May, although some sow early in June. Early sowing gives better yields. Late sowing retards maturity and insures better keeping quality over a long period, in storage.

Large growers use drills in planting the seed bed, making the rows about a foot apart. If the seed is good, eight seeds to the inch of drill is sufficient. If the soil is fine and moist, a half-inch of covering is sufficient.

The amount of seed required per acre depends upon the percentage of germination or viability of the seed and the method of growing the plants. A pound of good seed should supply sufficient plants for four acres, if properly grown under glass. Sown in the open, not more than sufficient plants for two acres can be expected from a pound of seed.

Planting.—Well hardened cabbage plants will stand a temperature as low as 15 degrees below freezing, if not over too prolonged a period. The plants may be set out as soon as hard freezing weather is over. Late cabbage is planted in June or July, allowing about four months for development, before freezing weather in the autumn.

Small head varieties like Jersey Wakefield are set 14 by 26 and even as close as 12 by 15 inches. Larger varieties like Early Summer and Succession are set 18 by 28 or in rows three feet apart to permit of ease in cultivation. Large late varieties such as Flat Dutch are set two feet apart in rows 3 to 3½ feet apart. The total yield will be heavier when distances are medium rather than close.

Cabbage plants are set by hand in small plantings and by machine in large plantings. Hand transplanters are also used which carry water and apply it when the plant is set. The machine planters are drawn by horses or tractor. They open the furrow, apply water and cover soil about the roots. The machines require a driver and two men to drop the plants, each setting a row, so two rows are set at the same time.

CABBAGE (GIANT GREEN SAVOY)

The soil should be moist when the plants are set and the ideal time is when the weather is cloudy. The growth of the plants should be checked as little as possible and to this end retain as much soil as possible on the roots of the plants when transplanting.

Dibbers, trowels and the hand alone are used, when plants are set by hand.

In setting plants, use only strong plants, as the weak ones at best make slow growth or die, leaving blank spaces to be filled.

Cultivation should begin as soon as the plants "take hold" and are erect and the cultivation should be repeated frequently and as late as possible. Early in the day the leaves are limp and there will be less damage to the plants if it is done at that time.

The cultivation of cabbage should be very shallow, particularly after the plants have attained some size. The shallow roots extend out almost horizontally across the space between the rows and deep cultivation will disturb the roots and do more harm than good. Sufficient cultivation should be given to keep down the weeds and conserve moisture. When the plants are about half grown, only sufficient cultivation may be needed to keep down the weeds and it should cease when the plants are so large as to be injured by the operation.

The hand hoe should be used to keep the weeds down between the plants.

Harvesting.—Cabbage grown for early market is harvested as soon as it attains marketable size, to take advantage of a high market price. Cabbage is really not in best condition for handling and for food until the head is hard and solid. After the rush of the early market, the crop is not harvested until the heads have matured and are hard.

A large butcher knife is used in cutting cabbages and this should be frequently sharpened. One hand is placed on the head which is gently drawn over to one side and severed with the other hand. Care should be exercised not to bruise the heads. The outer leaves are removed, and the head trimmed up to improve the appearance.

When the crop is to be stored in pits, the cutting is done with a sharp hatchet. Stubs four or five inches long are left for convenience in handling.

Marketing.—As with most crops, it pays to grade cabbage. The U. S. Department of Agriculture has established two grades of cabbage, as follows:

"**U. S. No. 1** shall consist of heads of cabbage which are of one type, fairly firm and well trimmed; which are not soft, withered, puffy or burst; which are free from soft rot, seed stems and from damage caused by discoloration, freezing, disease, insects or mechanical or other means.

"In order to allow for variations incident to proper grading and handling, not more than 10 per cent, by weight of any lot may be below the requirements of this grade.

"Any lot of cabbage consisting of heads of more than one type but which meet all other requirements of U. S. No. 1 may be designated '**U. S. No. 1 Mixed.**'

"**U. S. No. 2** shall consist of heads of cabbage which do not meet the requirements of the foregoing."

In addition to this statement of grade, any lot may be classified as Small, Medium, Large, Small to Medium, or Medium to Large, if 75 per cent, by weight, of the heads conform to the following requirements for such sizes:

Type	Small	Medium	Large
Pointed	Under 2 lb.	2 to 4 lb. inclusive	Over 4 lb.
Other types	Under 4 lb.	4 to 6 lb. inclusive	Over 6 lb.

Southern cabbage is sold by the crate or barrel and this is the general style of packing in the North. The crate is the best package on account of ventilation and convenience of packing loads. Crates vary in size greatly and it would be well if a standard size were adopted.

Barrels are quite commonly used for winter shipments. For summer use, four or five large vents should be cut with a hatchet in the sides of each barrel.

Cabbage should be dry when packed. Large quantities, in warm weather, should be shipped in refrigerator cars—in slat cars in cool weather and in box cars in cold weather.

Storing.—Much of the late crop is stored and sold during the winter and spring. Out door pits and special store houses are used for this purpose.

Success in storing depends on good long-keeping varieties such as Danish Ballhead, having compact, hard heads. The stored crop must be free from disease and bruises or injury of any kind. A uniform temperature of about 35 degrees, with moderately humid atmosphere to prevent wilting, but not so much as to cause condensation.

Cabbages can be wintered in conical piles in the same manner suggested for root crops. In the North the crop can be safely stored in a well drained field near the building where the crop will be prepared for market. The heads should be placed on their sides on the ground in rows, three heads wide, side by side, the rows running up and down hill, to insure drainage. Two rows may be placed on top. Cover lightly with straw. Furrows are then drawn with a plow on each side of the rows, throwing as much soil as possible over the cabbages. The work is finished with shovels, placing six inches of earth over the straw. In December when the weather becomes very severe a covering of 3 or 4 inches of manure is given or an additional covering of straw, held in place with a covering of earth, which has been kept from freezing, for the purpose.

Insects.—Cabbage Maggot (*Phorbia brassicae*). This is a small whitish larva of a black fly—smaller, but resembling the common house fly. The eggs are deposited below the surface of the ground on or near the roots of the plants. The eggs soon hatch and the larvae feed on the plants, feeding on the rootlets and then burrowing into the main root, causing the plants to wilt and die. The plants surviving the attack are unable to form more than poor heads.

For early cabbage in the open a solution of corrosive sublimate is used; one ounce of powder to eight to ten gallons of water. Apply a half cupful about the plants when the fly appears, usually when the plants are set. One or two additional applications may be required a week or ten days apart.

Disks of tar paper placed around the plants before the fly appears act as a repellant and prevent the fly from depositing the eggs near the plants. The disks must not be covered with soil.

For the late crop, the plants are grown in frames covered with cheesecloth, which prevents the fly from depositing eggs near the plants. The soil of the seed bed soaked with corrosive sublimate is also effective. This is a deadly poison and deaths have occurred from handling it carelessly, leaving it about, where it has been taken in mistake for something else.

Aphis (*Aphis brassicae*). This is commonly called the "cabbage louse." This insect multiplies rapidly. Spray with kerosene emulsion or nicotine sulphate adding soap as an adhesive. Dusting with nicotine preparations is also effective.

Green Cabbage Worm or Imported Cabbage Worm (*Pontia rapae*).—This is the larvae of a small white butterfly with two black spots on the fore-wings of the female and one on the fore-wings of the male. It is about an inch long, nearly green, finely dotted with black spots. It eats holes in the leaves and into the heads.

The remedy is spraying with arsenate of lead, 2 lbs. of powder or 4 lbs. of paste to 50 gallons of water, with 4 lbs. of soap added as an adhesive. A dust is also used composed of one part arsenate of lead powder and four parts of air-slaked lime, applied when the dew is on the plants.

Southern Cabbage Worm.—This is the larvae of a butterfly resembling the adult of the green cabbage worm, distinguished by being pure white. The larvae is purple and yellow-striped with black spots. The control is the same as for the green cabbage worm.

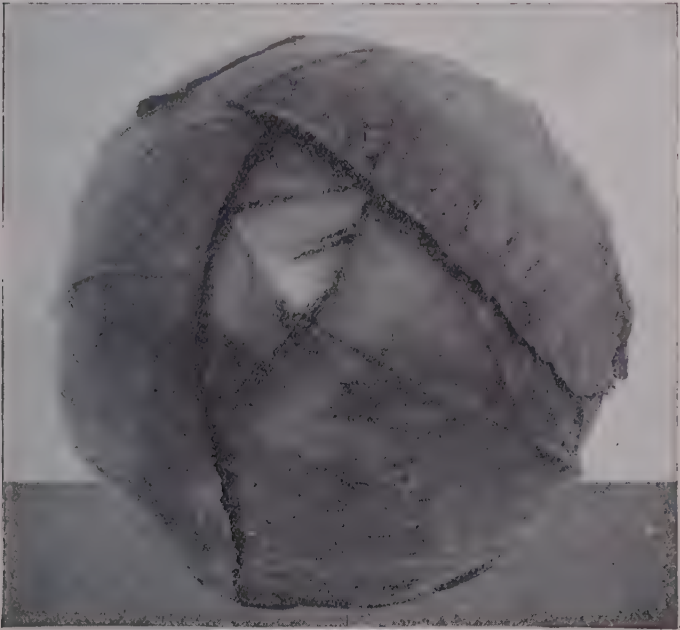
Cabbage Looper (*Autographa brassica*) feeds on the foliage of cabbage and related plants. Easily distinguished by its method of traveling by doubling up. It also injures lettuce, celery and other crops. The method of control is the same as for the green cabbage worm.

Other troublesome insects include the diamond-back moth, cabbage webworm, crossed-striped cabbage worm, and purple-back cabbage worm. The same control measures are used as suggested for the green cabbage worm.

Diseases.—**Club Root** is destructive to cabbage, cauliflower, Brussels sprouts, kale, radish, turnip and other plants. It is caused by a slime mold. Affected plants wilt quickly in warm weather. The roots show swellings which often become decidedly clubbed. The organism thrives in acid soil. Heavy applications of lime to correct acidity is the remedy. Cabbage land should be well limed the autumn before spring planting.

Plants should be grown in uninfected or disinfected soil. Diseased plants should be burned.

Black Rot (*Bacterium campestre*), a decided yellowing of affected leaves is the first indication, following by the dying of



CABBAGE (MAMMOTH ROCK RED)

the leaf, the vein becoming black. The plants show a dwarfing or one-sided growth of the head, or no head may be formed.

The method of control is wholly precautionary. Seed should be disinfected by soaking for 15 minutes in a formalin solution, made by dissolving one pound of formalin in 30 gallons of water. Soil of the seed bed should be free from disease. Diseased plants should be burned. Clean cultivation at all times helps greatly in keeping down insects and disease.

Root Knot is caused by an eelworm, which penetrates the root and causes irregular swelling often confused with club root. This disease is serious in the South, but not troublesome in the North.

Crop rotation is the remedy, growing crops immune to root-knot. Three or four years' rotation and clean cultivation.

Corn, rye, timothy, wheat, sorghum, velvet beans and peanuts are immune or highly resistant.

Yellows is indicated by yellowish color of the foliage a few weeks after transplanting.

Disinfection of the seed with mercuric chloride solution, diluted 1 part to 1,000 and the crop planted on disease-free soil form a disease-free seed bed. Mercuric chloride is a poison.

Volga, Houser and Wisconsin Hollander are Yellows-resistant varieties.

Black-Leg is caused by a fungus parasite. It may attack any part of the plant. Severe loss occurs when it kills the stems of the young plants. Infection frequently occurs on the stem near the surface of the soil, causing dark sunken areas.

The disease spreads, killing the stem and roots. The plant wilts, the leaves adhering instead of falling off as in the Yellows. In advanced stages, the dead areas are covered with small black specks which are the source of the trouble. These live in the soil on parts of the diseased plant. The control is the same as for black rot—also, clean cultivation.

Warm Weather Treatment in the South.—Growers of cabbage and cauliflower in Texas appealed for help, stating that notwithstanding the fact that overhead irrigation was used, the soil dried rapidly and the cabbage plants suffered as the weather became warm.

It was suggested that the liberal use of imported granulated peat moss thoroughly incorporated with the soil would hold the moisture. This material absorbs moisture like a sponge and keeps the soil from drying out quickly, in addition to other benefits the plants may derive from it.

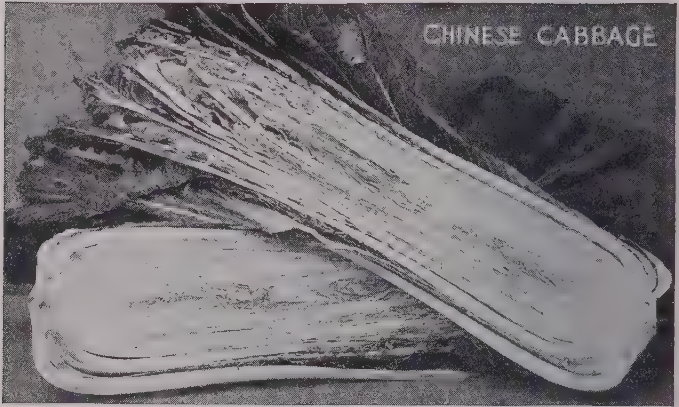
After the plants are set, mulch the soil heavily over the whole bed, at least an inch deep with peat moss. Wet early in the day, with the sprinkler or other system, and wet sufficiently to go through the mulch into the soil.

The hot atmosphere will cause the water in the mulch to evaporate and the process will considerably reduce the temperature of the soil which will be beneficial to the plants.

Cabbage and cauliflower require an ample supply of water and particularly so when the weather is warm.

Chinese Cabbage is comparatively new in America although it has been grown in China for centuries. Its use here is increasing, both as a salad plant and as a pot herb.

There are two distinct types, one a tall, loose leaf variety growing like Cos lettuce, called Petsai, the other a shorter and more compact head called Wong Bok.



CHINESE CABBAGE (PETSAI)

Culture.—In the South, Chinese cabbage is grown as a winter crop and in other sections as an autumn crop.

If the seed is sown in the open ground in the North, sow it two or three weeks later than cabbage. As a spring crop, sow the seed in a greenhouse or hot bed, treating the plants quite like cabbage. The plants should be transplanted while small in order not to check growth. Usually the plants are ready for transplanting in about a month after the seed is sown.

As an autumn crop the seed may be sown where the crop is to grow, thinning so the plants will stand about a foot apart or somewhat more according to the variety.

The soil should be rich and moist—a good loam or sandy loam. Muck soil is ideal. The soil should have plenty of vegetable matter in it, manure or green crops, turned under. The general care of the crop is the same as for cauliflower.

Varieties.—The Chinese and Japanese seedsmen of the Pacific Coast catalogue several varieties.

Our seedsmen need to do testing of the different varieties of Chinese cabbage and then standardize on names. One of the best varieties is Paoting. This variety grown by Robert Smallridge, of Irondequoit, N. Y., had well formed solid heads, weighting eight or nine pounds. The heads when prepared for cooking were creamy white, crisp and tender. Creamed like cauliflower it was delicious. As cole slaw it was excellent and it was also good as salad.

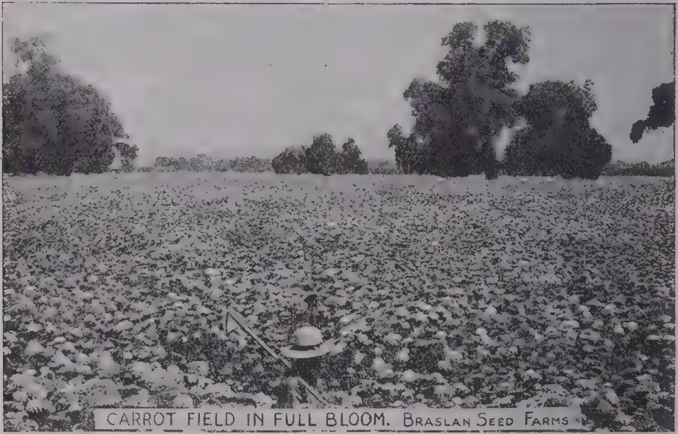
Fertilizer.—Growers of Chinese cabbage use a 5-10-5 fertilizer, that is the percentage of nitrogen, phosphoric acid and potash, at the rate of one-half to three-quarters of a ton to the acre. On muck soil which is likely to contain considerable nitrogen, a fertilizer low in nitrogen, but high in potash is used, usually a 2-8-10 mixture.

Harvesting.—The crop is harvested when the heads have developed, cutting them from the stalk quite the same as cabbages. The loose, outside leaves are removed and the heads boxed or crated for market.

In China the heads are stored in cellars for winter use. No determined effort has been made in this country to work out a successful storage plan.

CARROT

The Carrot is a biennial. A thick root and whorl of leaves are formed the first year. The flower stalk starts early in the second season growing two to three feet high, and on this the seeds are produced. If the season is long and early varieties planted, flower stalks may be produced the first year. For seed, the late varieties, in the North, must be taken up and stored safely over winter and replanted the next spring.



CARROT FIELD IN FULL BLOOM. BRASLAN SEED FARMS

Soil.—The carrot thrives best in a deep, loamy or sandy soil or muck. Sandy soils produce early crops. Loam or muck produce heavier crops.

The soil for carrots should be prepared as for beets. A very fine, smooth seed bed is necessary as carrot seed is small, slow to germinate and the delicate seedlings are unable to push through heavy or hard soil. The beds must be kept free from weeds.

Climate.—The carrot is adapted to a wide range of climate. It is sufficiently hardy so the plants will stand some freezing, but they will not stand the severe or prolonged cold of northern winters.

CARROT (DANVERS HALF LONG)

CARROT (Danvers Half-Long, Closer view)

Planting.—Carrot seed is sown where the crop is to mature. The seed may be sown as soon as hard freezes are over in the spring, in the North, and in the South in the winter or spring

CARROT (OXHEART)

as soon as hard freezes have passed. A succession of roots is obtained by planting the same variety of seed at intervals of about two weeks, or by sowing early, medium and late varieties at the same time. A quick maturing variety is used for the last sowing, made two months before the last killing frost. The late varieties require four to five months to mature.

Where the demand is for small roots, early, small rooted varieties are planted throughout the season. The half-long varieties being used for late autumn and winter use.

Twelve inches between the rows is sufficient for the small, early varieties and sixteen inches for other varieties where the wheel hoe is to be used for cultivation. For horse cultivation, thirty inches is required.

Two to three pounds of seed are required per acre, for hand cultivated crops. For small roots, fifteen to twenty seeds to a foot of row and a third less for large varieties, covering from one-half to three-quarters of an inch.

The plants are thinned to secure large roots of uniform size, leaving the plants from two to six inches apart.

Carrot seed germinates slowly and the seedlings are delicate. Radish seed is sometimes sown with the carrot seed. The robust radish seedlings appear quickly, marking the row, so cultivation may begin sooner to conserve moisture and keep down the weeds.

Fertilizing.—Carrots require a liberal amount of potash. A 4-6-10 or 4-12-12 nitrogen, acid phosphate and potash in the percentage given will produce good results.

CARROT (CHANTENAY)

Fresh stable manure should never be used for carrots. If manure is used, it should be thoroughly rotted.

Cultivation.—The field must be kept free from weeds. The slow growing carrot plants cannot compete with weeds. Hand weeding will be necessary in the rows.

Harvesting.—Carrots for bunching may be harvested as soon as they are a half-inch in diameter at the top. This sometimes is a thinning process.

Early carrots are tied eight to twelve to a bunch, with the tops left on, after washing and grading to uniform sizes. Late carrots are generally topped and sold by measure or weight.

When the entire crop of long roots is harvested at one time, a plow is run close to the row, with the cut edge of the furrow next to the plants. The roots are then easily pushed sidewise and easily pulled.

Storage.—Carrots can be held in storage as described for beets. They keep best if not too ripe when harvested.

Yield.—Three hundred bushels per acre is a good crop, but much larger yields are produced.

Varieties.—The most popular varieties are Chantenay, Dauvers Half-Long, Oxheart, Short-Horn, Half-Long, Early Scarlet Horn and Nantes Coreless.

CAULIFLOWER

Cauliflower is the refined member of the cabbage family. Mark Twain described cauliflower as a "cabbage with an education." The heads are the shortened, thickened parts of the flowers. It thrives best in a cool, moist climate. It is largely grown on Long Island and in Western New York—and in California and Florida in winter. Cauliflower will not stand as much heat or cold as cabbage and it will not head in hot weather.

Climate.—Climatic conditions are as important as a suitable soil. To grow cauliflower successfully the climate must be cool, moist and humid. Sections near large bodies of water, as on Long Island and along the Atlantic Coast, at Puget Sound and near the Great Lakes, are ideal, although success is had in the interior in high altitudes where the air is cool and the atmosphere moist. Overhead irrigation is valuable for cauliflower.

Soil.—When weather conditions are favorable less attention need be paid to the character of the soil. A deep, rich, well drained soil is desirable. Rich, heavy loams and light soils produce good crops.

Fertilizing.—The cauliflower requires very liberal fertilizing, even greater than cabbage. Rotted manure can be used to good advantage up to 40 tons to the acre, particularly on sandy soil. If manure is not available green manure crops should be turned under to supply organic matter. Decayed leaves are useful for this purpose. An unlimited supply of fallen leaves may be obtained in the autumn for the trouble of gathering them. Gathering leaves is light and easy work and children ten or twelve years old can gather them and are glad to earn a little money in this way. Keep a pile of leaves decaying in some out-of-the-way place. When well rotted the material is very useful and valuable.

If manure is used, a ton of high grade fertilizer is commonly used in addition. A ton of high grade fertilizer to the acre should be sufficient, where the soil contains a liberal supply of humus.

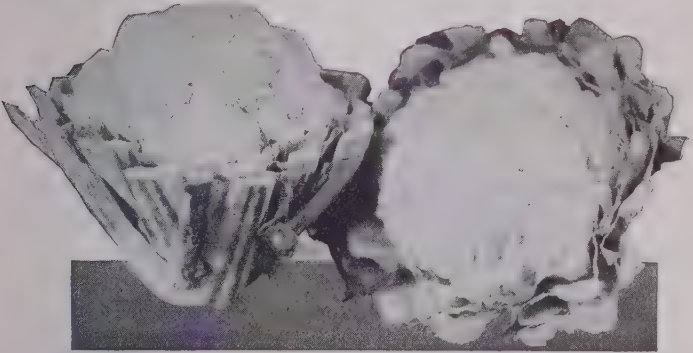
Various fertilizer mixtures are used, 4-8-4; 5-10-5; 5-8-8, etc., indicating the percentage of nitrogen, acid phosphate and potash.

Leunasalpeter, the new air nitrate, will probably be found valuable for top dressing cauliflower crops. It is a so-called double salt (not a mechanical mixture) containing 26 per cent. nitrogen. It is peculiarly valuable in having the quick action of nitrate of soda and the slower or sustained action of sulphate of ammonia and, properly used, will perfect the cauliflower crop about two weeks earlier than the same crop without it. Calcium nitrate is also excellent for cauliflower.

Lime is valuable and is largely used to prevent club root.

Seed.—A commercial grower cannot afford to take chances on any crop with cheap seed and this is especially true in the case of cauliflower. Start with the very best seed to be bought. Consider the quality of seed only and pay the price. To do otherwise is to invite failure. The price of cauliflower seed varies according to the crop. The price range is somewhere from $2.00 to perhaps $6.00 or more an ounce. An ounce of good seed should produce from 2,500 to 3,000 plants. Our best seed comes from Denmark.

Producing Plants.—Cauliflower plants are grown in quite the same manner as cabbage plants. The beds must be kept moist, but overwatering must be avoided. Good ventilation is necessary. The growth should be steady, but not rapid or forced. In California and Louisiana and other sections in the South, the seed beds are made in the open ground. In the North the seed is sown about the first of March, the plants being ready for the field after the danger of hard frosts has passed, in May. Some growers transplant when the seedlings are quite small, setting them two inches apart each way.



CAULIFLOWER

In the South, when the plants are set in August or September, the weather is hot and it is difficult to get a good stand of plants, starting the plants in the open ground has produced good results. (See the last paragraph under cabbage, for a suggestion on growing cabbage and cauliflower in the South.)

Planting.—In the North, plants for early crop are set out as soon as the danger of hard frosts has passed. The late plants are set from the last of June until the first of August.

The early crop is figured to mature before hot summer weather. The late crop is planted to head with the cool autumn weather.

In the South and in California, cauliflower is grown as an autumn and winter crop.

The rows are generally set three feet apart and the plants from eighteen to thirty inches apart in the row. The method of planting is the same as for cabbages.

Cultivation.—Weeds should be kept down by clean cultivation. The root system is quite like the cabbage and the same method of cultivation should be followed.

Protecting Heads.—The heads should be perfectly white and must be protected from rain and sun, starting when the head is small. Draw the outer leaves up over the head and tie them with raffia or tape.

In hot weather when the plants are growing rapidly, the heads will blanch in two or three days; in cold weather eight or ten days longer may be required.

In hot weather, if the plants are left too long, the leaves will rot and stain the heads, so the plants must be watched and harvested at the proper time. In cool weather, if left too long, the flower stalks are likely to start. Frequent examinations should be made of the heads until the entire crop has been gathered. Medium sized heads are in greatest demand.

Harvesting.—The plants are cut off near the ground with a large, sharp knife, carefully loaded and taken to the packing shed. Here the leaves are trimmed from the heads, leaving a part of the stem, and a couple of circles of leaves.

Marketing.—Crates are being used more and more for cauliflower, holding one or two dozen heads. Paraffin paper wrapped about the heads will help keep them in perfect condition. The best looking heads naturally bring the best price.

CAULIFLOWER (DWARF ERFURT)

Varieties.—Dwarf Erfurt, a medium early, is a general favorite. Early Snowball is an early, dwarf variety; winters over well for early crop. Danish Giant or Dry Weather will head with less moisture than any other. Early Snowball is used both as an early variety and for late planting. A good variety under glass. Close, compact habit, can be planted closely.

Diseases and Insects.—Cauliflower is troubled with the same insects and diseases as cabbage. The same control is required, except that arsenical sprays should not be used after the head is formed.

CELERIAC

Celeriac or Turnip-Rooted Celery is one of the popular European vegetables which Americans are gradually learning to use. The thick tuberous base is used for flavoring; it is also cooked and used as a salad. It has the flavor of celery. The tops can be used for soup greens.

Celeriac may be stored in winter like turnips or beets, the leaves being removed before storing. Packed in sand and stored in a cool place the tubers will keep for months.

The culture is practically the same as for celery. The early crop is started under glass and transplanted to the open ground when danger of severe frosts has passed. The late crop is sown in the latitude of New York City in the open in a well prepared bed, about April 20, covering the seed about half an inch, firming it well. Thin the seedlings out to about an inch apart in the row, later transplanting into rows two feet apart, and five or six inches apart in the row where the plants are to be used when about two inches in diameter. If the roots are to be used when large, the spacing of the row should be eight to ten inches apart. A rich, moist soil gives best results.

Celeriac seed requires three to four weeks to germinate and during this period the soil should be kept moist and warm.

CELERIAC

The plants do not require blanching although a little earth thrown over the roots in the autumn will whiten them and afford protection until early winter when they may be stored.

Celeriac is cooked in various ways. Cut in cubes, boiled and creamed it is excellent. It is good for flavoring stews. For salads it is sliced very thin and put in boiling water, then cooled and mixed with other vegetables or fruit.

The variety generally grown is Prague, sold under various names; Giant Prague, Large Smooth Prague, Large Smooth, Large Prague, etc. Delicatesse is a new variety of promise. It is white, tender and does well on light soil.

One ounce of seed will sow 400 feet of row.

CELERY

Celery is grown in large quantities on rich, drained muck lands in New York, New Jersey, Michigan, Florida, and many other states. Celery is also grown largely in upland truck gardens, quite generally over the country, with other garden crops.

Celery grows well on muck land but it will not thrive in wet soils. The land must be well drained, either naturally or artificially. Open ditches answer in muck land, providing the soil is drained from two to three feet deep. In some cases, tile are run between the ditches setting them low enough to allow for the gradual settling of the soil, which is considerable on muck lands.

Parallel ditches are required at sufficient distances to thoroughly drain large areas of muck and in some cases laterals should be run to the main ditches so as to quickly and thoroughly drain the cultivated area between the ditches in the wettest

CELERY (GOLDEN, SELF-BLANCHING)

weather. The ditches must be kept clean and free from any material that may clog them.

Celery may be grown on any good garden soil that has been well enriched with stable manure or other organic matter. Manure applied in the autumn and turned under, then a quick growing cover crop immediately thereafter, such as rye, to be plowed under in the spring, give the soil a double coating of organic matter. This is good practice for all garden crops. Water should be available in dry weather. The overhead sprinkling system is excellent for celery. The plants should not be stunted at any time during the growing season for want of water.

Celery Prefers a soil of loose texture, one that does not pack hard around the plants. If only clay soil is to be had, this should be very heavily manured with stable manure or green crops or both, to lighten it up as much as possible. Sand spread over clay soil and incorporated with it, will help to lighten it and lime also will assist, but lime should not be used immediately preceding or following applications of stable manure.

Muck land that is sour or acid will not produce good celery. Draining and weathering by exposing such soil to the action of frost, together with applications of lime or wood ashes, will correct the acid condition. Lime should be used sparingly, 500 to 1,000 pounds to the acre.

Land that has grown corn, potatoes or some other cultivated crop, so the cultivating has put it in good tilth and freed it from weeds, will grow celery.

Where land is grown successively to celery each year, it is plowed as early in the spring as possible. Larger plows are used in muck than on uplands and the soil is plowed deeper, ten inches being customary. On muck soils too soft for disking, the spring tooth, acme or smoothing harrow is used. The plank drag is often used to smooth the land, break up clods and pulverize the soil. The land is alternately harrowed and dragged until in fine condition.

CELERY FIELD
At Sanford, Florida. Golden self-blanching variety

Fertilizers.—On the muck lands of Michigan where celery is grown continuously, from thirty to forty tons of manure are applied annually. This is obtained from nearby cities and the Chicago stock yards, but the supply is gradually diminishing and green manures are being relied upon.

On the Great Meadows, New Jersey, celery farms, a 3-8-7 commercial fertilizer is used, 3 per cent. nitrogen, 8 per cent. acid phosphate and 7 per cent. potash, using 1,000 to 1,500 pounds to the acre, broadcast and harrowed in before planting. When the crop has made a good start, the rows of plants are side dressed with 200 pounds of nitrate of soda to the acre, when the plants have been set out from four to six weeks. This application is repeated in about four to six weeks thereafter. The fertilizer is scattered along the rows but must not come in direct contact with the plants. It is then cultivated into the soil. Apply when the foliage of the plants is dry. One application of 250 to 300 pounds of leunasalpeter will answer the same purpose.

Salt.—In the celery growing districts of Kalamazoo, Michigan, from 600 to 800 pounds of salt are applied annually per acre. A part is broadcast over the land in the spring after plowing, and it is harrowed in lightly a couple of weeks before setting the plants. After the first crop is harvested in early July, more salt is applied between the rows of the second crop. The plants are then well established in the field. The Kalamazoo growers claim the salting makes the plants brittle, tender and of better quality.

It is possible that muck land will take salt liberally without injury to the plants, where very much less could only be used safely on other soils, or equally good plants might be produced without salt.

Sulphur.—Powdered sulphur is recommended for celery land, 200 pounds broadcast in the autumn or spring for uplands and up to 400 pounds on muck land. Sulphur keeps down rust and blight and may have some fertilizing value. It aids favorable bacterial action in the soil. The use of sulphur tends to make the soil acid.

Seed and Seeding.—In growing celery be sure to obtain first-class seed. Many failures are caused by poor seed which fails to grow or produces plants lacking in vitality and uniformity and subject to diseases. Good seed must, be true to name, have good germination and produce strong and vigorous seedlings. Purchase celery seed only from reliable sources. Fresh seed should be obtained each year. If seed is to be saved for another year keep it in a sealed Mason fruit jar, placed where the temperature is moderate and uniform.

Starting the Seed.—To make the July market, in the neighbothood of New York City, seed is sown in the greenhouse or hotbed about the middle of February, and by the first of April the plants are transplanted one inch apart in rows one and one-half inches apart in cold frames protected from frost. The transplanted plants are set out in the field as soon as the weather permits. In case there is little or no frost after April 15, the transplanting in frames may be dispensed with and the plants transplanted directly from the seed bed into the field.

A small greenhouse can be made from ordinary hotbed sash and heated with a small stove.

Soil of Seed Bed.—The soil of the seed bed should consist of a rich garden soil containing an abundance of plant food and of a character which will not pack and harden. Muck soil or garden soil rich in humus will be found satisfactory. Imported granulated peat moss, well mixed with the soil makes an excellent seed bed.

Celery seed is very small and slow to germinate. The soil should be made very fine and smooth before sowing.

The Seed Is Sown broadcast by some and in rows by others. The latter plan permits of some cultivation which the former does not, and the plants in rows are easier to weed.

Cover the seed not over one-eighth of an inch deep and sow thick enough to give a good stand of plants without crowding. Good seed will germinate about 60 per cent. An ounce of seed should produce about 10,000 plants.

After sowing, the seeds are covered with burlap and sprinkled. If the soil was sufficiently moist, but not too wet to work before the seed was sown, watering may be dispensed with, but the soil must not be permitted to dry out. Peat moss absorbs and holds moisture in the soil. It keeps the soil loose so the small roots make good growth.

The temperature of the seed bed should be kept at 75 degrees F. during the day and ten degrees lower at night and somewhat lower during dark weather.

Ventilation should be given whenever the weather conditions permit and the plants hardened off gradually by increasing the ventilation until out of door temperatures may be endured before planting in the field. Never allow the plants in the frame to freeze.

A large percentage of culls or small plants at harvest time is due to the use of poor seed or crowding of plants in the seed bed.

The seed of the second crop is sown about the last of March, usually in hot beds.

Celery to be harvested after the first of September is generally sown in outdoor beds, planting the seeds when the ground has become warm. Do not let the beds dry out. Keep the plants constantly growing, watering in the morning on bright days, so the foliage may become thoroughly dry by night. Thin out the plants from the seed bed as needed, taking out the weakest, leaving the others well spaced.

Transplanting induces the formation of an extended fibrous root system, causing a less serious check to growth when the plants are set in the field. This results in a crop a little earlier and possibly more uniform. The seedlings will be ready for the first transplanting four weeks after sowing the seed. Shallow boxes can be used for growing the transplanted seedlings in.

The ideal time to set plants is just before a shower or on a moist cloudy day. In bright weather set late in the afternoon. Water the seed bed well before transplanting and dig and lift the plants carefully. Plant in fresh soil, wet before and after planting and keep the plants wet and out of sun and wind from the time they are dug until reset.

With a boy to drop the plants, a man will set twice as many plants in a day as he will alone. The man straddles the row on his knees, which are protected with pads, takes the plant in one hand, making the hole to receive it with the forefinger of the other hand. The plant is set with its crown slightly below the top of the soil, which is pressed firmly about the root. On clay soils care must be exercised not to set the plants too deep. On sandy or muck soils there is less danger of the soil injuring the hearts of the plants.

HAND CULTIVATION OF CELERY. MICH. HORT. SOCIETY

Planting Distance.—Where celery is to be blanched by boards or paper, the rows may be from 18 to 30 inches apart. The narrower width for hand cultivation and the wider for horse.

Blanching with earth is not generally resorted to now. Where this is done, the rows are set from four to six feet apart, which is a great waste of space.

Set the plants four inches apart in the rows and keep the field clear of weeds.

For Double Culture, plant two rows side by side, six inches apart, staggering or zig-zagging the rows, that is, the plant in one row is set opposite a vacant space in the other row.

At Kalamazoo, the first planting is set in rows three feet apart and a second crop is planted later between the rows. Sometimes only every alternate row is thus interplanted at first, but a late crop is afterwards set in the vacant rows.

Cultivation.—Constant shallow cultivation is required. Almost as soon as the plants are set in the field, they should be cultivated, being particular not to throw any soil over the hearts of the plants. Hand hoeing may be necessary between the plants. Cultivate after every rain and frequently enough to keep the soil well pulverized on the surface. Keep the surface level.

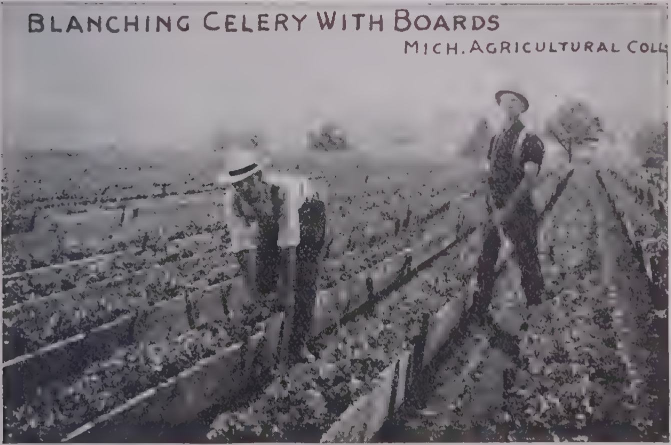
Blanching consists of excluding the light from the leaf stalks while the plant continues its growth, which destroys the coloring matter, making the stalks light colored, mild in flavor and more crisp and tender.

Boards or paper are used for blanching during the summer, as earth used at this time will cause the plants to rust. Celery to be blanched during the cool weather of autumn, may be banked with earth, which gives good results and protects the plants from light freezes. When the crop is to be stored for winter use, it will blanch in storage, if the temperature is not too low, and it will keep better if not blanched too much in the field.

Where earth is used for blanching a small quantity of soil is banked against the base of the plants by hand, to hold the stalks together. This is called handling and leaves the plants ready to be banked by a plow or hiller or other method. As the crop continues to grow the earth is raised higher about them.

Blanching with Boards.—Sound hemlock boards, one inch thick and ten inches wide, fourteen to sixteen feet long, are used. The boards are placed as close as possible along each side of the rows of plants and held in place by pegs driven in the ground.

Double hooks or arches, six or eight inches long made of heavy galvanized wire are sometimes used to hold the upper edges of the boards together or short pieces of lath are nailed across the rows, from board to board, to hold them in place. Cleats nailed across the ends of the boards help to keep them from warping and splitting. After the boards are in position, draw a little soil along the lower edges of the boards to close any openings caused by unevenness of the soil.



BLANCHING CELERY WITH BOARDS

MICH. AGRICULTURAL COLL

Two to three weeks are required to blanch ordinary celery, but American Golden Celery will blanch in a few days. Harvest as soon as blanched.

Plants per Acre and Lumber Required for Blanching

Distance between rows	Distance between plants in inches	Number of plants per acre	Lumber required for blanching in square feet
1½ feet	4	87,000	58,000
2 feet	4	65,240	43,500
3 feet	4	43,560	29,000
4 feet	4	32,670	21,750

The Cheapest Blanching Method is with celery paper which comes in rolls ten inches wide, 300 feet to the roll. It is quite stiff, being made of two layers of heavy waterproof paper, with asphaltum and fibre between. It will last several years.

For large operations machines are made for applying the paper. Another machine winds up the paper when taken off.

Wire arches or wickets made of No. 9 galvanized wire hold the paper in place.

Time to Maturity.—It takes four to five months to mature a crop of celery in the field.

The crop should average 300 crates to the acre, each crate averaging 8 bunches, each bunch containing 12 stools or plants.

Celery Can Be Packed in crates or lettuce boxes. Crates are made 22 by 22 by 22 inches, of the following material:

4 posts	1¼×1¼×22 inches
4 strips	¾×2½×22 inches
8 strips	½×2½×22 inches
4 bottom strips	½×4½×22 inches

Crates can be bought ready made from some lumber concerns.

Harvesting.—When the crop is harvested during the summer months and is to be shipped, the plants should be dug and taken to the packing shed early in the morning, as fast as dug. Exposed to sun and wind, the plants wilt and lose their firmness, so the boards are removed only as fast as the celery is dug. If the packing shed is far distant, cover the plants in transit.

The plants are trimmed by removing the outer leaves and cutting the roots to look well. They are then thoroughly washed in cold water which helps to keep them fresh and firm. After draining well, they are tied into bunches of twelve plants.

In bunching, a rack is used on the packing bench which will hold twelve good-sized plants. Red celery tape is used for tying, one tape at the base, another nearer the top.

Storing.—Celery stored for early winter use is usually trenched. This consists of digging a trench in the field, a foot or more in depth, in which the plants are closely set, so the tops are only an inch or so above the ground. The blanching boards are set over the top of the trench to form a slanting roof, which is covered with earth as the weather gets cold.

Number of Celery Plants to the Acre

Distance between rows in feet	Distance between plants in inches	Number of plants
1½	4	87,000
2	4	65,240
3	4	43,560
4	4	32,670
5	4	26,160
3	5	34,848
3	6	29,000
4	5	26,240
4	6	21,780

Varieties.—Golden Self-blanching is a popular variety and the one most largely grown. Medium early. The plants are of medium height, erect and compact. The foliage is a yellowish green. The heart is large and blanches to an attractive light yellowish color.

Golden Plume is an improved form of Golden Self-Blanching and it is offered by different seedsmen under different names. This variety was carefully bred by a New Jersey celery grower over a period of years and is a decided improvement over Golden Self-Blanching. The color is better, the stalks larger and more tender, and stringless, maturing early. It is resistant to blight and rust and keeps well. It is very attractive and sells well in market. One New Jersey grower in 1924 received $3,000 an acre for his crop of this variety.

Early Blanching resembles Golden Self-Blanching, but the leaves are green and the stalks white instead of yellow. Blanches quickly. Crisp, solid and stringless. Keeps well.

Earligreen is a large growing, early variety. The outer stalks are green, the heart pure white and of fine flavor. Sown in February and March, set out in May, it arrives in the New York market by the middle of August.

Giant Pascal is the leading late or winter variety, erect and compact in growth. The stalks are thick, nearly round, broadening toward the base. It blanches yellowish-white, is solid, crisp and tender and a good keeper.

French's Success is probably the best keeping celery that has been introduced. There is nothing better for storage. Some gardeners keep it until spring when high prices are obtained. The stalks are of medium length, very compact, with a well-developed heart which forms early. Blanches perfectly white and is brittle without stringiness.

Columbia is a second, early, green celery of good quality. A heavy, stocky plant, blanching a light golden yellow, crisp and tender.

Pithiness, or hollow stalk, may be caused by too rapid growth, check in growth, or by seed produced from pithy plants. Good seed generally produces good plants and good crops when given good care, and poor seeds the contrary.

Premature seed stalk is caused by early sowing, crowding of plants in the seed bed, soil in seed bed too poor or too rich, drought or anything which checks growth—or poor seed.

Insects.—Celery has no serious insect enemy. Grasshoppers may be troublesome at times; caterpillars and tarnished plant bug may cause a little trouble at times.

Diseases.—Early blight and late blight are common celery diseases. Also "damping off" and storage rot, which are controlled by spraying with Bordeaux mixture.

Late blight is the most serious and is first indicated by brown spots on the leaves, the spots uniting until the whole leaf becomes dry. The fungus lives over winter in refuse from diseased plants. The seed may also carry the fungus.

Soaking the seed in hot water at a temperature of 115 to 120 degrees F. for a half hour is one remedy. As the spores are usually dead on seed that is two years old, the use of old seed of good germination is quite generally practiced. If the disease is in the soil, these remedies are of no avail.

Spraying with Bordeaux mixture made of 5 pounds of copper sulphate, 5 pounds quicklime, and 50 gallons of water, with a soap sticker will keep the plants in a healthy condition, if the spraying is done thoroughly as soon as the disease appears and the plants kept covered with Bordeaux during the growing season.

Early Blight is controlled by the same method as late blight and also "damping off."

CELERY CRATED. MICH. AGRICULTURAL COLL.

CHARD

Chard, called Swiss chard, leaf beet and silver beet, is another good potherb not yet well appreciated in this country. The leaves are cooked like spinach, while the stalks and midribs are cooked like asparagus and are excellent on toast. It is especially valuable for summer greens as it stands hot weather better than most plants used for this purpose. It may be canned in the same manner as spinach.

Chard likes a soil rich in humus. Any good garden soil will give satisfactory results. Best results, however, will be obtained where a green crop has been turned under or the soil well supplied with stable manure. Where no manure is used, 1,000 pounds of high grade fertilizer is recommended, to the acre.

Urea, which is an air nitrate, is especially valuable for chard, which is grown to some extent as a forcing crop in greenhouses. This material is 46 per cent nitrogen and does not leave the soil alkaline as does nitrate of soda, or acid, as is the case when sulphate of ammonia is used. For field crops leunasalpeter is an excellent top dressing, containing as it does, 26 per cent of nitrogen.

Culture.—Chard is easily grown. The plants may be started under glass in February, transplanting into flats before being set in the open ground, which may be as soon as hard frosts are over. The seed may be sown in the open ground at the time beet seed is sown. The rows should be 18 inches apart for hand cultivation and 24 to 30 inches for horse cultivation. When plants are set out space them 10 to 12 inches apart. When seed is sown, drop 12 seeds to each foot of row, thinning when the plants are about 6 inches high, to 3 inches and later to 8 to 12 inches. The plants removed may be used for greens.

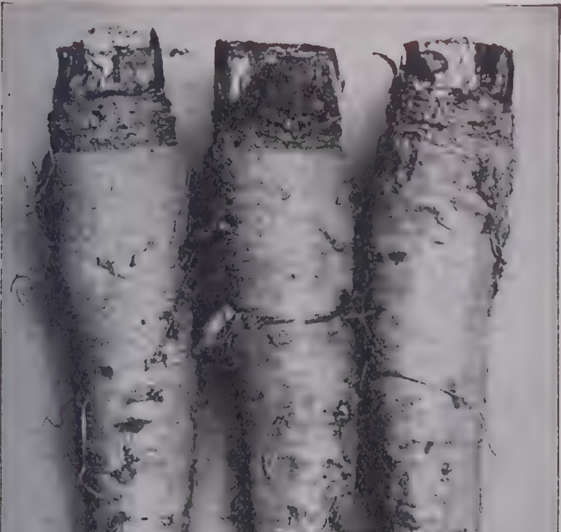
With a heavy mulching the plants will winter in many parts of the North. They may be protected with cold frames and forced early in the spring.

Harvesting.—The outer leaves are cut off an inch or two from the ground, while they are still tender with a large, sharp knife, being careful to avoid injuring the central bud and leaves which are left for additional growth. The leaves, if soiled, are washed, and tied in bunches.

Varieties.—Lucullus is the most popular. It has pale green, crimped and curled leaves, like savoy cabbage. The stem and mid-ribs are white and broad and of good flavor. Fordhook Giant is a new variety. The leaves are heavily crimped, borne erect on broad, greenish white leaf-stems in marked contrast with the very dark glossy green of the foliage. Full grown leaves are 30 inches long and almost a foot wide. The plants might be used effectively as foliage plants in an ornamental garden. The cooking quality is excellent. The plants should be spaced two feet apart in the rows to allow for proper development.

CHICORY

Chicory, Witloof, Witloof Chicory, French Endive.—Chicory has been used as a salad plant for ages and Witloof, in the last few years has become popular with American salad connoisseurs. It is now served in season, in the best restaurants all over the country.



WITLOOF CHICORY OR FRENCH ENDIVE READY FOR STORING AND PLANTING. N.Y. EXP. STA. GENEVA

The chicory commonly used in Europe is the Large Rooted Magdeburg, the roots of which are cooked like carrots and the leaves used as pot herbs or greens, cooked like spinach. The leaves also make good salad when taken from one year old plants. Several cuttings may be made from the same plants.

The roots of the Magdeburg variety are dried by cutting in thick slices, about as carrots are sliced for cooking; they are then dried, roasted, ground and mixed with coffee or used as a coffee substitute.

For this variety of chicory the soil should be light, rich and deep. Any soil that will grow good root crops will grow good chicory. The seed is sown about May first, in the North, in rows from 2 to 3 feet apart, covering firmly with a half-inch of soil. Thin the plants in the rows to stand six inches apart and cultivate well. The culture is practically the same as for carrots or parsnips. The roots are hardy and may be left in the ground over winter.

One ounce of seed will sow 200 feet of row; four pounds will plant an acre.

Witloof Chicory is the popular variety for salad. The seed is planted out doors, in the spring or early summer, in rows 15 to 18 inches apart, the young plants thinned to stand 4 to 5 inches apart in the row. Too early planting may cause the flower stalk to grow and produce a root of no value for forcing. Ordinarily, if a seed stalk appears, here and there, cut it out.

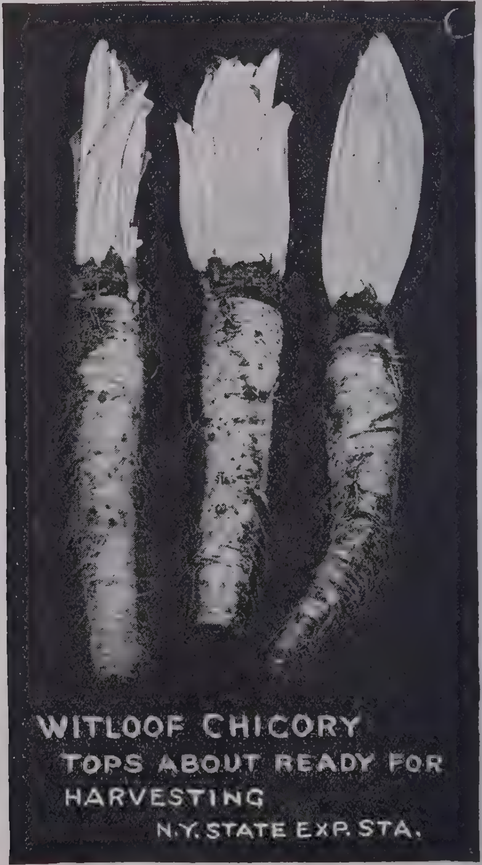
Forcing.—On the approach of cold weather the roots are lifted and the tops cut off an inch above the crown. Trim the roots at the base so that altogether they do not exceed 8 inches in length. The roots are then stored in a cool place until they are wanted for forcing.

The crop may be forced under greenhouse benches or in cellars where a temperature of from 50 to 60 degrees can be maintained. If the temperature is higher the heads will not be so solid.

Grade the roots according to size before planting, so the plants will be of uniform height, so the tops will be covered at an equal depth. Large roots produce large heads. Medium to large roots produce the best market size heads. The demand is for heads about 6 inches long.

In the late autumn until spring, the roots are taken from storage, from time to time for a succession, new plantings being made every two weeks or so.

The roots are set in trenches in a slanting position, close together, with the top just below the surface, and thoroughly watered. The plants are then covered with fine soil, sand or



WITLOOF CHICORY
TOPS ABOUT READY FOR HARVESTING
N.Y. STATE EXP. STA.

sawdust, to a depth of 6 or 8 inches. Imported granulated peat moss is excellent for this purpose. It is inexpensive, light in weight and can be used over and over. It is sold by the large seed houses.

The light is excluded by the covering, which also keeps the leaves and stems compact. One or two later waterings may be required, but if soil is the covering, it must not be soaked. Peat moss, made slightly moist, holds the moisture and ordinarily only one watering will be required.

Marketable heads develop in three or four weeks.

Some growers set the roots in outdoor trenches, about 18 inches deep and of equal width. The roots are covered with soil as for indoors. Over the covering of soil about two feet of fresh stable manure is placed, extending a foot or two each side of the trench, to afford protection from freezing.

Another plan usually followed in home gardens is to use a strong box about 14 inches deep. Lay the box on its side and pack the roots in it, in layers, with the bottoms of roots toward the bottom of the box. When the box is filled, set it up on its bottom and cover the plants 6 or 8 inches deep with dry leaves or peat moss. Water frequently enough to keep the covering damp, not wet. Roots treated in this manner about November first will be ready for salad about Christmas time.

If, when cutting, care is taken not to cut into the crown, new shoots will be sent up through the winter.

When marketed, the heads are cut off at the base, the outside leaves removed and the heads packed in two quart berry baskets or other small baskets, to meet the requirements of the market where sold.

CHIVES

CHIVES

The chive is one of the onion family, a perennial, native of Europe. The plants grow in thick tufts of hollow leaves resembling miniature onions. The leaves are used for seasoning on account of their onion flavor. The flowers are small, violet-red. The plants are usually grown as an edging and do better when kept in narrow rows. Replant every two or three years as transplanting freshens up the plants. The leaves when wanted for table use, for chopping up and using with salads, or for flavoring, are cut with a knife and the more frequently they are cut the more vigorously they seem to grow.

Chives will thrive in any good garden soil. They are propagated by dividing the plants in the early spring or from seed sown about half an inch deep in rows a foot apart, thinning the plants to stand about six inches apart.

Small boxes of chives are occasionally seen growing on window-sills of apartment houses, in any of our large cities.

COLLARDS

Collards are grown for their leaves, which grow on a stalk two to three feet high in good soil. They are grown in the South, but not to any extent in the North.

Collards will thrive in more heat than cabbage will stand and are used in place of cabbage in summer. In the winter collards are used for greens and a little frost improves the flavor.

The seed is sown in beds in the spring and in the autumn in the South. The plants are set in rows about 3 feet apart, 2 feet apart in the rows. The cultivation is the same as for cabbage.

CORN (Double Yield Golden Bantam Sweet Corn)

CORN

Sweet corn as a commercial crop is confined to the Northern States and little is grown south of Maryland.

Sweet corn should be marketed and eaten as soon as possible after it is harvested, because the quality and flavor deteriorate rapidly after the ears are pulled from the plants. The higher the temperature the greater the deterioration.

Sweet corn may be grown farther north than field corn, as it is used in the green state and the kernels do not have to harden before harvesting. Excellent sweet corn is grown as far north as Canada.

Sweet corn is best grown for home or nearby markets where it can be handled and delivered to the consumer while in good condition. Large acreage is planted for canners.

Maryland leads in acreage, followed by New York, Iowa, Ohio, Illinois, New Jersey, Maine, Indiana and Michigan.

Sweet corn is of comparatively recent introduction. In the old countries the word corn means any kind of grain,—oats, barley, wheat, rye or corn. Our American corn or Indian corn is native of America, both North and South America, and was grown by the natives, before white men discovered these continents. It is called "maize" in Europe.

Corn belongs to the grass family of the genus *Zea Mays*. Sweet corn has been bred up from field corn.

Soil.—Corn is grown on a great variety of soils. Any soil that will grow field corn will grow sweet corn. Sandy loams are preferred for early crops. When a large yield is desired, rich, retentive soils are best. Heavy loams are favorites for the canning crops. Sod land is preferred by some growers and fertile land which has been cultivated the preceding year is also used. Muck soils give good results. Sod land is plowed in the autumn and cross plowing in the early spring will be beneficial, followed closely with the harrow and frequently enough to fine the soil thoroughly and retain moisture until planting time.

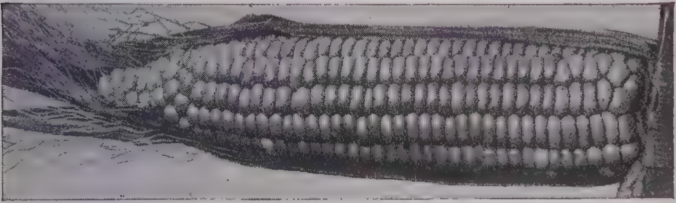
Fertilizers.—Stable manure is used at the rate of 10 tons to the acre, with a light application of nitrate of soda or leunasalpeter to give the plants a quick start and 500 pounds of acid phosphate.

Where manure is not used, green crops are turned under to keep up the humus supply, supplemented with 1,000 to 2,000 pounds of high-grade complete fertilizer to the acre. A 5-10-5 mixture, 5 per cent. nitrogen, 10 per cent. phosphoric acid and 5 per cent. potash, is a satisfactory combination.

If a small amount of fertilizer is used, say 300 pounds to the acre, the application should be in the hill, covered with about an inch of soil before dropping the seed. Larger applications can be applied, part in the hill and part broadcast. When applied in the hill, care must be exercised not to injure the plants with too heavy applications.

Planting.—For a very early crop the seed may be started in a greenhouse or hotbed, from 3 to 4 weeks before the plants are to be set in the field. The seeds planted in paper pots or bands, or in clay pots, several seeds to each pot.

Care is necessary in transplanting not to disturb the roots. Get the entire ball of earth from the pot without breaking the ball. Set this in a hole made with hand, trowel or otherwise and gently draw the earth about it. When the plants are established, thin to the desired number to each hill. This method will only prove profitable where a nearby market will take an early crop and pay a good price for quality combined with earliness. Some of the early sweet corn, coming from a distance, has almost no flavor.



CORN (GOLDEN NUGGET)

Pots are now to be had, made of material through which the roots grow. These can be set out with the plants in them so the roots are not disturbed.

Sweet corn cannot be planted until danger of frost has passed. It often pays to take chances on early planting where the early market brings good prices. In case of failure be prepared to plant a second time. It is usually safe to plant about the time of the last killing spring frost.

For a succession, early, medium and late varieties are planted at the same time. More often the same variety or similar varieties are planted at an interval of 10 days to 2 weeks. The last planting is timed so the crop may be harvested just before frost. Stowell's Evergreen is a good variety for a very late planting to be harvested late. The flavor of the corn gathered at this very last harvest, which sometimes is late in November, under favorable weather conditions, is delicious.

The planting distance depends on the variety. In home gardens, where space is limited, the low growing varieties will stand close planting.

Hill cultivation permits cultivation in both directions with horse or tractor, but the plants should not be hilled up. Keep the surface of the whole field level. Less hand cultivation is required when the hill system is used. Six to eight seeds are planted to a hill and plants thinned to 3 or 4 to a hill. Place hills from 2½ by 3 feet for a low growing variety, to 3 by 3 feet or a little more for the large growing sorts.

When planted in drills, the seeds are dropped thinly along the drill and the plants thinned to 10 to 15 inches apart in the rows, the rows about 3 feet apart. Seed drills can be used for small plantings. Machine planters are used for large acreage. On the average, 14 pounds will plant an acre, though at times as much as 20 pounds may be required.

If pure yellow corn or pure white corn is wanted, yellow or black varieties should not be planted near white kinds. The pollen of the white corn will cause some of the kernels of the yellow varieties to turn white, giving the ears a spotted appearance. The yellow kinds will cause the white corn to be spotted with yellow kernels. Do not plant sweet corn near field corn.

Do not plant corn in a single row. Plant at least three or four rows side by side. The pollen does not fertilize the ears well when planted in single rows.

Use the best seed obtainable. Seed grown in the East is best for sweet corn.

Cultivation.—After the seed is planted, the first cultivation should be with a weeder or a spike-tooth harrow before the corn comes up, particularly if there has been a rain and the soil has crusted. Cultivate in the middle of the day after the plants are up, as the damage then will be slight. This keeps down the weeds which is the sole object of cultivating corn. When the plants are about 3 inches high, a cultivator is used between the rows.

The land having been thoroughly prepared before planting, only very shallow cultivation should be given at any time. When the plants are of good size the roots cross the rows, close to the surface and deep cultivation does more harm than good.

Suckering is removing suckers from the base of corn plants, an old but not a good practice. Don't do it.

Harvesting.—Sweet corn is harvested in the milk stage. The kernels should be plump, but not hard, nor in the dough stage. Handle quickly and at as low a temperature as possible.

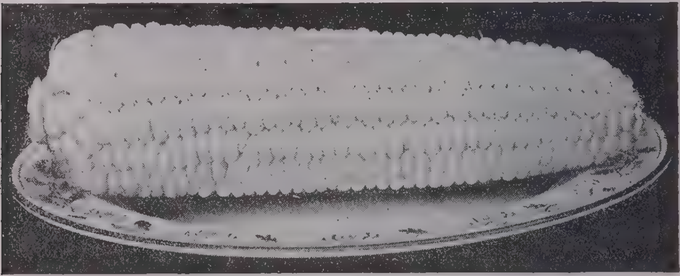
Corn that has been loaded in tight wagons or tightly covered with canvas, standing over night, will deteriorate rapidly.

Corn is packed in boxes, baskets, crates and bags. When shipped to distant points, corn should be packed in well ventilated crates and shipped in refrigerator cars.

Varieties.—Sweet corn is classed as early, medium and late according to the time from planting required to produce edible ears.

Alpha is one of the earliest varieties. The ears are 5 to 7 inches long, white, 8-rowed and of good quality. The seed is hardy for corn and can be planted earlier than many other varieties.

Whipple's New Yellow.—Earlier than Golden Bantam with large ears, 7 to 8 inches long, 12 to 16 rows. Tall stalks produce two ears of good quality.



CORN (WHIPPLE'S YELLOW)

Whipple's Early.—Ears are 16 to 20-rowed. Tender and sweet, 7 to 8 inches long. A week earlier than Howling Mob. Two weeks earlier than Evergreen. Stalks 7 feet high.

Buttercup.—An exceptionally sweet variety. Ears 8 to 10 inches long, 8 to 12-rowed, yellow kernels. Medium early, maturing with Golden Bantam. A good market variety.

Golden Giant.—Midseason to late. Ears 7 to 8 inches long, 12 to 14-rowed. Fine quality, maturing after Golden Bantam.

Golden Bantam.—Small plants, bearing small ears, 5 to 7 inches long, 8 to 10-rowed, rich yellow of good quality when just ready for the table. Does not last long in good condition.

A Double-Yield, Golden Bantam is offered, growing two and three ears to the stalk instead of one.

Early Mayflower.—One of the best of the very early varieties. Ears about 6 inches long, 10 to 12-rowed, white.

Stowell's Evergreen is an old variety, the leading late corn. The kernels are white, sweet and deep, 12 to 20-rowed and remain fresh longer than other varieties. Good for market and canning.

CORN (GOLDEN BANTAM)

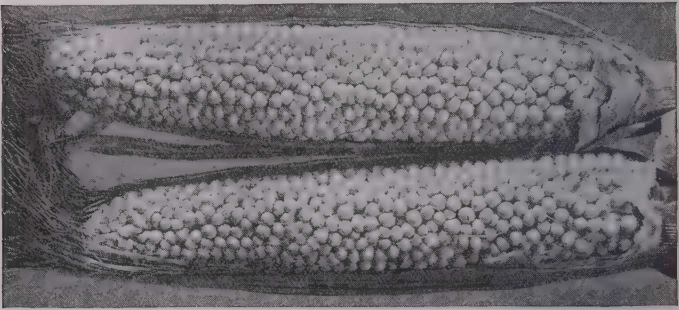
Howling Mob.—A second early, white and tender corn of good quality. Matures after Golden Bantam, ears 7 to 9 inches long, 12 to 14-rowed. Plants are low growing. Important market variety in some sections.

Crosby's Early.—A mid-season variety of good quality. Ears 7 inches long, 10 or 12-rowed, white and sweet. Plants are small.

Country Gentleman.—Large ears, irregularly arranged, slender, deep grains. Ears 7 to 8 inches long, of good quality. Medium sized stalk.

Black Mexican.—Medium early, plant 6 feet high, ears 8 inches long, 8-rowed, bluish purple grains turning black and not good for market in many places on this account. The quality is fine.

Improved varieties are offered from time to time in seedsmen's catalogues.



CORN (COUNTRY GENTLEMAN)

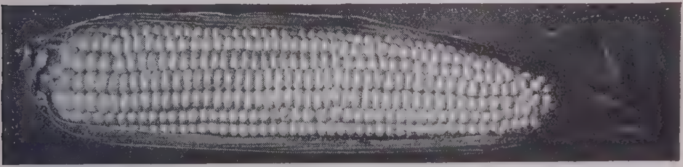
Insects.—Until recently the most destructive insect was the corn earworm. Now we have the cornborer. Also cutworms, white grubs, wireworms, and the southern corn rootworm.

The corn earworm is serious in the South and is troublesome also in many sections of the North. This insect is the same as the bollworm of cotton, which is quite different from the boll weevil. It is the same as the fruitworm of tomato. It is also known as the budworm of tobacco and is troublesome on other vegetables, such as squash, pumpkin, and melons.

This worm is the larva of a moth. The eggs are laid on the silk and the worms work down under the husk to feed on the tender kernels. Rain and dew enter through the worm hole, resulting in decay. The worms are 1½ to 2 inches long when grown, varying from light green to brown.

The control is by dusting the silk with arsenate of lead powder.

The European corn borer has evidently been in this country for a considerable time, as it is widely scattered, having been found in Canada, Ohio and other places where it seems to have spread from eastern New England.



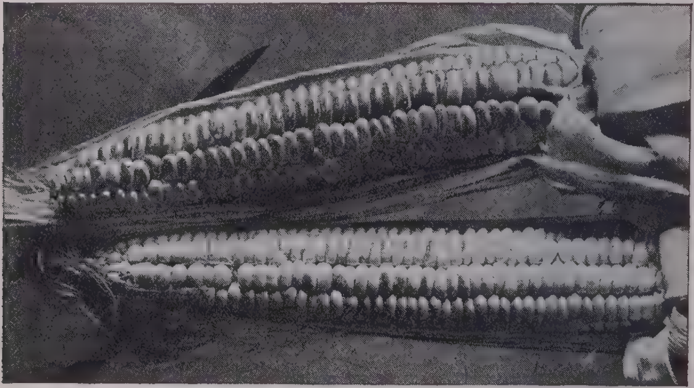
CORN (STOWELL'S EVERGREEN)

The larvae are about ¾ of an inch long, of a yellowish-gray color, with very light red or brown stripes. They bore into the plants. Borings on the stalks causing them to break, usually just above the ear, indicate their presence.

The borer feeds on vegetables, flowers, and weeds. The corn should be cut close to the ground as early as practicable. As much of the crop as possible should be placed in the silo, including all waste from canning factories. The fermentation destroys the borers. Cut or shred cornstalks before feeding. This kills the borers and cattle will consume larger quantities.

All uneaten cornstalks on the place should be completely plowed under or burned by the first of May. Early autumn plowing, thoroughly done, will kill many borers. Burn all weeds or grass near infested fields.

Early planted corn is most likely to be troubled. Later plantings are usually troubled less. In infested areas, coarse-stemmed vegetables to be sold green should be at least 50 feet away from early corn.



CORN (BLACK MEXICAN)

Southern Corn Rootworm,—This is the larva of the twelve-spotted cucumber beetle. This insect is injurious to corn, beans, peanuts and other vines. Corn is injured when the plants are small, feeding on the roots and boring through the crown. Corn in meadows and on damp land is subject to greatest damage.

The beetles should be destroyed when feeding on the plants above ground. Crop rotation of cotton, grain and other vegetables than beans or vine crops, is a remedy.

Cutworms are treated as described under lettuce.

White Grubs are the larvae of May beetles or June beetles.

They feed on the underground portions of plants and are plentiful in crops following sod. Clean culture and autumn plowing is the remedy. Hogs and chickens permitted to run in newly plowed land will destroy many. When they are numerous in sod land, do not plant it to corn.

Wireworms are the larvae of click beetles. They are long, brownish, hard-shelled larvae, injuring the roots of crops. They are more difficult to control than white grubs, but are treated in the same manner.

Diseases.—Corn smut is the most troublesome disease of corn. The black masses which it forms on ear and tassel are familiar to all who grow corn. The first appearance is a shiny, swollen area, covered with a white membrane, which turns black, as the spores within mature. The membrane breaks and the black powdery spores are released.

The control measure is to gather and burn the smutted ears and stalks before the spores are released.

CORN SALAD

Corn salad grows wild among the grain, which is called corn in Europe, therefore the name, corn salad. It is not much relished by native Americans, but is used in this country by Europeans who have settled here, for salad, greens and seasoning.

Corn salad is sensitive to heat and is grown as a spring or autumn crop. The plants are hardy and may winter where the weather is not too severe, protected with mulches or cold frame. The plants grow 2 feet high, but the young leaves are tender and those who eat them consider them delicious. Two crops are gathered from the same plants.

Corn salad will thrive in any good garden soil. Dressings of leunasalpeter or nitrate of soda may be used to advantage.

For the spring crop, sow in the open ground as soon as it can be prepared. For winter and early spring use, sow in September. It should be protected over winter by a light mulch of straw. Sow the seed thinly in shallow drills. The rows may be as close as a foot apart, the plants 6 inches apart in the rows. Corn salad likes plenty of moisture. It matures in six to eight weeks.

CRESS

Cress.—The leaves of cress are used in salads and in garnishing. A fine salad can be made from fresh radishes, the whole plant washed clean, the leaves served whole on a dish. Over the radish leaves place a layer of water cress and cover this with thin slices of radishes.

Three forms of cress are cultivated, all members of the mustard family.

Water cress is a hardy, perennial, aquatic plant, in demand in city markets. Water cress thrives in shallow, pure and clean running water.

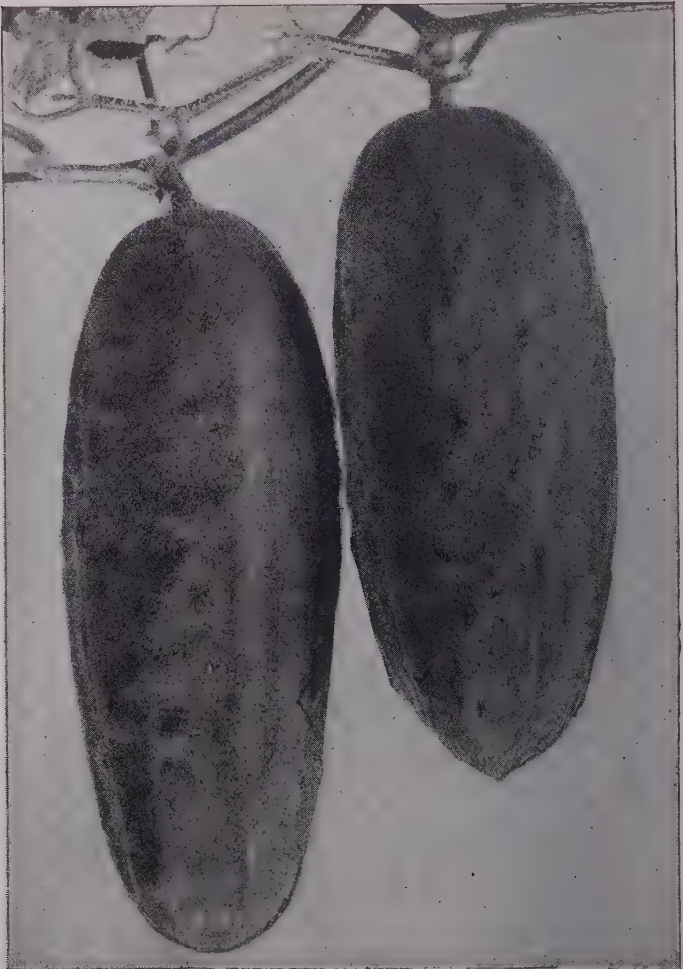
It is propagated by scattering the seeds along brooks or about springs or by planting small pieces of the stems in wet soil. Streams are sometimes divided so as to force two or three branches to extend the planting area. When established it will grow year after year, if not picked too closely.

Water Cress in the Garden.—Water cress may be grown in moist or wet, shady places in the garden or where it can be irrigated, setting the plants about 5 or 6 inches apart each way. It can be grown also in moist soil in hotbeds or greenhouses. The seeds may be started in a well prepared seed bed and the young plants transplanted or pieces of stems used.

CRESS

Garden or Pepper Cress.—This is an annual, one of the mustard family, easily grown in any good garden soil. It is a cool weather plant and the seed should be sown as soon as the bed can be made ready in the spring, in cool, rich soil, in rows a foot apart and the plants thinned as used for market or table. Remove the leaves carefully so as not to injure the crown of the plant, and it will continue to bear. Conserve moisture by frequent tillage and water frequently.

Garden cress is a native of this country. It is hardy and does best as a spring and autumn crop. It does not do well in hot weather. The seed will remain in the soil over winter and germinate in the spring.



CUCUMBER (DAVIS PERFECT)

CUCUMBER

Cucumber.—The cucumber is one of the oldest cultivated vegetables. Its history dates back into obscurity. It has been cultivated in India for 3,000 years or more and is supposed to have been introduced into China the second century before Christ. It was known in France in the ninth century and was introduced into England somewhere from the fourteenth to the sixteenth century. It was known to the early Greeks and Romans. Cucumbers were grown by the early Colonists in America and by the Indians in Florida about the sixteenth century.

The cucumber is one of the cucurbits or vine crops, which are tender annuals. All are hot weather crops. All are monoecious, having the stamens or pistils in separate flowers on the same plant.

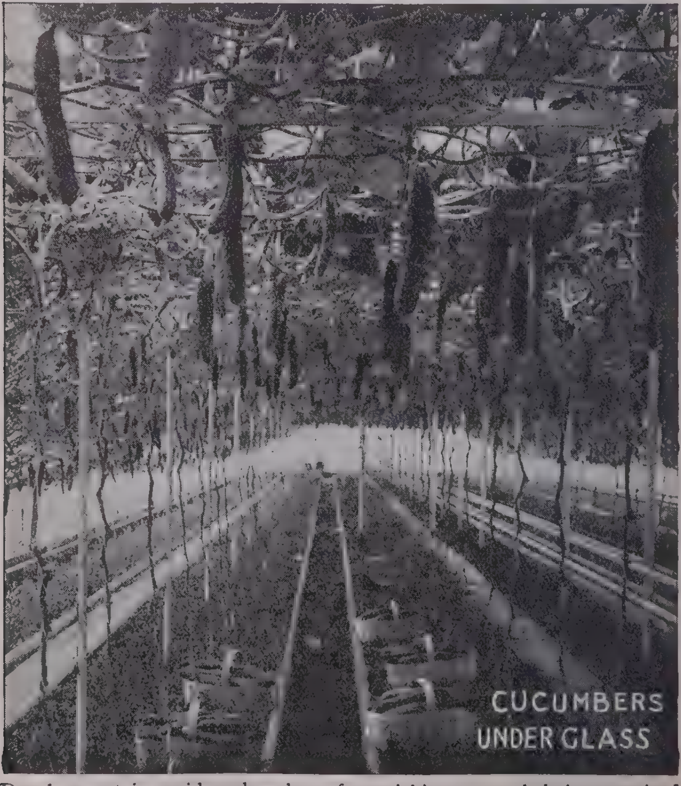
The cucumber is not of importance for its food value, but is largely used in salads and for pickles.

According to the census of 1920, Michigan was the leading state producing cucumbers, to the value of $1,176,686. Florida was second with production valued at $1,389,665. The total value of the crop in this country at the time the census was taken was estimated at $8,579,162.

The cucumber is grown commercially, on a large scale, under a wide range of climatic conditions. The cool summers of the North are well adapted to growing pickle sizes. The trucking section of the South and the Atlantic Coast are favorable for early crops. Cucumbers are sensitive to frost and to extreme heat and thrive under cooler conditions than melons. As only a short season is required to mature the crop, cucumbers can be grown successfully in most sections of the country.

Soils.—Light sandy soil is best for the early crop. Yields are heavier over a longer period on heavy soil. Clay loams are good for late crops and for picklers. The soil should be well drained but retentive of moisture.

Early plowing and frequent harrowing to conserve moisture



Development is rapid under glass, four pickings a week being required until planting time are important. A green crop of some kind should be grown in the autumn to be turned under in the spring. Some growers throw up low ridges for the early crop, insuring good drainage and somewhat warmer soil. The plants are started on these ridges.

Fertilizers.—A liberal amount of humus is needed in the soil to insure yields of high quality. If green crops are turned under and commercial fertilizer used liberally, or well rotted stable manure in good quantities used, unchecked growth may be had, which is necessary for best results.

Well rotted manure gives the best results applied in the rows or hills. Trenches or furrows are made, the manure placed in the trenches and the soil thrown back over it and the seed planted in the soil over the manure. Where manure can be used in large quantities, it is also spread broadcast.

When planting in hills a shovelful or two of manure is placed in each hill. Where manure is used some commercial fertilizer will be needed. Excessive amounts of nitrogen must be avoided.

Where manure cannot be had, imported peat moss may be used in the hills to good advantage. It retains moisture and develops helpful humic acid.

Where a green crop or peat moss is used without manure, a chemical fertilizer should be used containing 2 to 4 per cent nitrogen, 10 per cent acid phosphate and 6 per cent potash. On poor soils, use 1,000 to 1,500 pounds to the acre. On rich soils, 400 to 500 pounds to the acre. Where manure is used 10 per cent. of phosphoric acid and 8 per cent. potash with about 2 per cent. nitrogen to give the plants a quick start.

Planting.—Cucumbers are very tender and the seeds will not germinate when the soil is cold, so planting must be delayed until the ground is warm and there is no danger from frost. Early crops bring such favorable prices that gardeners take chances and devise plans to beat unfavorable weather. Some plant seeds at two different depths at the same time. The seed planted nearest the surface comes through first. If the first plants are nipped by frost, the deeper planting coming on later may escape. Another plan is to make two, or even three, sowings side by side, a few days apart. After danger of frost has passed the most robust planting is permitted to develop and the others pulled up.

Planting in hills was formerly the general custom, the hills placed either 5 by 5, or 6 by 6 feet—closer on poor soils and wider on rich soils. Several seeds are planted in each hill, thinning to two plants, when the plants are well established.

Much of the crop is now sown in drills 5 to 6 feet apart, using 2 to 3 pounds to the acre. When well established the plants are thinned to stand 18 inches apart in the row. Less labor is required in planting in drills.

Around Norfolk, Virginia, the seed is sown in rows in cold frames. By the time the weather is warm, the vines are in blossom, or ready to bloom, when the sash and frames are removed and field cultivation given.

In the North the seed is started in greenhouses and hotbeds. It is important to have the plants grown in containers so they can be transplanted without disturbing the roots. For this purpose pots are used, paper pots, veneer bands and berry baskets. Formerly, inverted squares of sod were used. Thick, tough sods, cut in 6-inch squares, inverted and hollowed out for soil and seed. The whole sod is planted without disturbing the roots. "Growell" pots which may be planted with the plants in them, are especially desirable for starting cucumbers in.

Pots or other receptacles should not be less than 4 inches in diameter, filled with light, rich, porous soil. Six to eight seeds should be planted in each and the plants thinned, leaving the strongest two or four.

The seed should not be planted more than a month before the time they are to be set out, for if too far advanced they will be checked in growth when set out.

Seeds should be started in a temperature of 70 degrees F. by day and 60 degrees by night. Harden the plants before setting out, by free ventilation and moderate watering.

Do not set the plants out until the ground is warm and there is no danger from frost.

Young plants are retarded by cold winds and the rows are sometimes alternated with bush beans to afford the cucumbers protection.

Market gardeners often plant at intervals of ten days to two weeks for a succession.

One ounce of seed will plant 40 hills; two pounds will plant an acre.

In the North, the pickling crop is planted in June.

Hotbed Culture.—In the North, for growing in beds, the seed for the first crop is sown about the middle of March.

When the plants are small they are set four in a hill, thirty-two hills under each 3 by 6 sash. When about four inches high, usually four weeks from sowing, each hill is placed under a 3 by 6 sash, and given steady heat to keep the soil and roots thoroughly warm. The bed should be kept as nearly as possible to 70 degrees F. The heat is derived from the manure placed under the bed and the trapped heat of the sun. At night the sash is covered with mats and shutters.

The day temperature should not run over 90 degrees, nor below 50 degrees at night.

When the plants are established, reduce the number to three to a hill. The same care is given as required for field culture. Development under glass is rapid and picking will be required four times a week. The picking will begin about June first, and if the weather is favorable, the glass may be removed. The buds usually continue bearing for six or seven weeks.

Cultivation.—Frequent and shallow cultivation should be given as long as possible without injury to the vines. Hand weeding may be necessary to keep the soil loose between the plants in the row. Keep down the weeds until the vines cover the ground.

Marketing.—The size in demand depends somewhat on the requirements of the market, but generally, for slicing, good sized cucumbers are desired, from 6 to 10 inches long. All fruit should be marketed before beginning to turn white or yellow and any showing these colors should be removed from the vines. Picklers are harvested when of a size the grower or purchaser desires. The fields are looked over two or three times a week for picklers. For slicing, the vines must be looked over quite as frequently to insure uniformity of size and maturity.

Packing.—Cucumbers for market are packed in boxes, baskets, hampers and barrels. Fancy cucumbers grown in greenhouses are packed in flat boxes and are sometimes wrapped separately in transparent paper, which adds to their fancy appearance. Careful grading, packing the fruit of uniform size adds greatly to appearance. Fancy greenhouse cucumbers cannot be put up too carefully. Whatever type of container is used, the fruit should be well packed so there will be no shifting in the package to spoil the looks of the fruit by the time it reaches the market.

Grading.—Cucumbers are graded on the basis of size, shape and general appearance. The U. S. Bureau of Markets suggests three grades, U. S. Fancy No. 1; U. S. No. 1; and U. S. No. 2. Specifications follow:

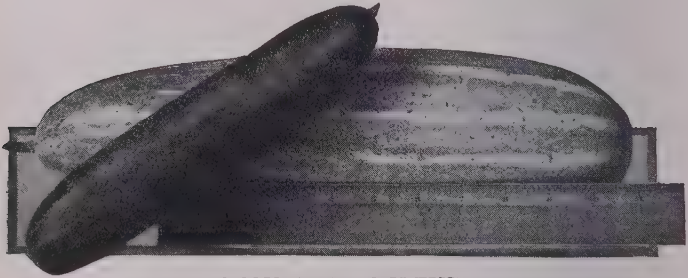
> "U. S. Fancy No. 1 shall consist of cucumbers which are fresh, firm, well shaped, well developed and have a green color over two-thirds or more of the surface and are free from damage caused by freezing, mosaic, or other disease, insects or mechanical or other means. Not more than 10 per cent, by count, of any lot may be below the requirements for this grade.
>
> "U. S. Grade No. 1 shall consist of cucumbers which may be slightly misshapen, but are fresh, firm, well developed and free from damage caused by freezing, mosaic or other disease, insects or mechanical or other means.
>
> "Ten per cent by count is allowed for variations.
>
> "U. S. Grade No. 2 shall consist of cucumbers which do not meet the requirements of the foregoing grades."

The marking requirements are:

> "The minimum length or the numerical count of the cucumbers in any package shall be plainly labeled, stenciled or otherwise marked on the package. It shall be stated in terms of whole or half inches, as 3 inches min. (minimum), 4½ inches min., and so on in accordance with the facts.
>
> "Not more than 10 per cent, by count, of the cucumbers in any package may be below the minimum length specified."

In addition to the marking requirements and statement of grade, any lot may be classified as Small, Medium or Large if 90 per cent by count, conform to the following requirements for such sizes: "Small," under 6 inches; "Medium," 6 to 9 inches; "Large," over 9 inches.

When shipped long distances cucumbers are forwarded in refrigerator cars under refrigeration.



CUCUMBER (DELTUS)

Varieties.—White Spine is generally grown for all purposes. It is early, productive and of good quality for slicing or pickling. The fruit is straight, light green, with white spines. Davis' Perfect is an improved strain of White Spine, suitable for growing under glass or for field culture. The fruits are from 10 to 12 inches long, of good shape, dark green and smooth. Early Fortune is an improved White Spine. The fruits are an inch or two shorter and a little earlier than White Spine. It is prolific. The skin is dark green, and does not fade when shipped to distant points. The flesh is tender and crisp with few seeds. The plants are vigorous, productive and blight-resistant.

Deltus is a strain developed by a market grower of Monroe County, New York. The fruit is 10 to 12 inches long, uniform in diameter for its entire length, with blunt ends. The skin is rich dark green.

Pickling varieties are sold under various names, Boston Pickling, Jersey Pickling, Chicago Pickling, Westfield Pickling, etc. Varieties of the same name procured from different sources vary considerably, although all the pickling varieties tested are somewhat similar.

The English forcing varieties are not generally used but are grown on private estates and are sometimes seen in the better markets in large cities. Strains of Telegraph are the ones generally used. The fruits measure about two feet in length and individual specimens have been grown which weighed ten pounds. The fruits are of uniform circumference over their entire length and contain only a few seeds.

Diseases.—Important diseases are bacterial wilt, downy mildew, anthracnose, mosaic and angular leaf spot.

Bacterial wilt is caused by bacteria carried by insects, particularly the cucumber beetle. Wilt may cause the plants to die while small or it may continue throughout the season. Cut stems show a sticky juice which draws out into threads. This disease attacks all the vine crops, muskmelons, pumpkins, squashes and watermelons.

As the disease is carried by insects, the first step is to control the insects. Pull up and burn all diseased plants as soon as noticed. Watchfulness, promptness and thoroughness are nine-tenths of the battle with the disease.

Downy mildew attacks the leaves during warm, moist weather. Yellow spots appear on the foliage, followed by curling and death. The old leaves receive the first attacks. The remedy is thorough spraying every week or ten days with Bordeaux mixture, beginning as soon as the disease appears.

Anthracnose attacks both leaves and stems. Brown spots appear on the leaves, appearing first on the old leaves. It spreads rapidly in warm, moist weather and unless checked may kill the plants. Muskmelons and watermelons are also affected. Spray thoroughly with Bordeaux as soon as the trouble is noticed.

Mosaic causes mottling of the leaves, stunting and yellowing the plants and mottling and warting of the fruit. This disease is carried by insects. Keeping the insects under control is the only known remedy.

Angular leaf spot appears as small angular spots which turn brown. On the stem it appears in the form of elongated bruises and sometimes on the fruit as water-soaked spots. Spraying with Bordeaux mixture will hold the disease in check. Treating the seed with corrosive sublimate, one part to 1,000 parts of water, for five minutes just before planting is considered benefical. This is deadly poison. Use it carefully planting and dispose of it carefully and completely as soon as used.

Insects.—The Striped Cucumber Beetle is about two-fifths of an inch in length. It is yellow above, with black head, the thick forewings longitudinally striped. The larva is a slender worm with brown head. These beetles are destructive to young plants and feed on the old plants and fruit. The larvae work on the roots and do serious damage. They carry wilt.

The beetles feed on the young plants as soon as they are up. Egg-laying begins immediately.

When plants are started under glass and set out when four weeks old the loss will not be so great. Seed should be used liberally when sown in the open ground, making allowance for this loss.

Covering the frames or hills in home gardens with mosquito netting is one remedy for beetles used also by small market growers, but it is not practical on a large scale.

Burn all the old vines as soon as the crop is completely harvested, cleaning the field of all weeds, which should be burned. This removes winter protection and will also destroy many beetles.

As a preventative, air-slaked lime, ashes, tobacco dust and Bordeaux-lead mixture are used to keep the cucumber beetle under control.

A mixture of kaolin, which is ground clay, 72 pounds, lime 24 pounds, and 4 pounds of nicotine sulphate has been used with good results. The plants are dusted with this mixture. Use freely also on the soil around the base of the plant stems. The dust is applied so as to prevent the beetle escaping by flight. The dust should be applied by a duster that will throw a good volume of dust with force. Cover the plants completely.

Apply as soon as the plants appear. Promptness in this respect may prevent severe loss.

Keep the plants and soil at base of plants well covered until all danger of injury has passed.

Twelve-Spotted Cucumber Beetle.—This insect injures the plants about the same as the striped cucumber beetle, but in the North it is not as serious. In the South the larvae feed on the roots of corn grasses and other plants and are called corn rootworms. The control measures are the same as for the striped cucumber beetle.

Squash Bug or common "stink bug" is a pest every gardener is familiar with. Adults live over winter in trash and attack plants as soon as they appear. The brown eggs are deposited on the under side of the leaves. Clean cultivation and burning all trash in the autumn is the remedy. Trapping the bugs under boards in the spring and hand picking may be necessary. Spraying with nicotine-impregnated dust will act as a repellant.

Squash Lady Beetle is orange, with black spots. Larvae are yellow with black spines. The larvae feed on the under side of all the cucurbits or vine crops. Not generally troublesome. Remedy—spray with arsenate of lead.

Squash Vine Borer, bores in the main stem near the surface of the ground where decay will soon begin. Wilting of the plants may be the first signs, followed by death of the plant. Remedy—plant early squash, which the borers prefer, using the squash as a trap. With a small bladed knife, cut a small slit in the vine and remove the borer; immediately covering the stem with earth and it will take root at that point. Burn all trash in the autumn; rotate crops. Plow infested fields deeply in the spring to bury the moths which will be near the surface, thus preventing their escape.

Melon Aphis or melon louse is a small sucking insect, feeding on the under side of the leaves. The remedy is the same as used for other aphis. Nicotine sulphate, 40 per cent. in strength, using with it 3 fluid ounces of yellow laundry soap wholly dissolved in 25 gallons of water. The soap can be first cut in small pieces and dissolved in a pailful of boiling water adding it to the water and nicotine, stirring the whole thoroughly. The under side of the leaves must be completely covered.

Flea Beetle is a small black shiny hard shelled beetle about a twentieth of an inch long, which eats holes through the leaves. Control consists of cleaning the fields in autumn. Spraying with Bordeaux acts as a repellant.

CUCUMBERS

Pickle Worm is a serious pest in the South and is frequently troublesome in the North. The larvae bore into the bud or blossom or even down into the stem, later attacking the fruit.

Spraying has not been effective. Burn vines and waste fruits. There are several broods each season. Growing squash vines as traps is sometimes resorted to.

DILL

DANDELION

Dandelions.—Wild dandelions make good greens when cut early in the season and also make an appetizing salad, and the leaves are used for garnishing. The size and flavor has been considerably improved by cultivation. The leaves can be blanched by tying together or holding them in place by drawing a little soil up about them. Near large cities where there are vacant lots, dandelions are a profitable crop. Near Paterson, New Jersey, market gardeners grow them in frames for an early spring crop.

The seed beds are made deep and rich to produce large leaves. The beds are prepared as early in the spring as possible and the seed sown in shallow drills a foot apart, the plants thinned to stand about six inches apart in the row. Wider spacing in the rows will produce large leaves. Several cuttings may be made, but the first is considered best.

DILL

Dill is used for flavoring. The seed is used for flavoring pickles. Sow the seed a half-inch deep, early in the spring in rows a foot or more apart, thinning the plants to stand 6 to 8 inches apart in the row.

EGG PLANT

Egg Plant is grown in the South Atlantic States and as far north, commercially, as New Jersey and to a limited extent on Long Island. Florida, California and New Jersey are the leading producers of egg plant. In the North it is frequently grown in gardens.

The bushy plants grow to a height of from 2 to 4 feet, the leaves are large and alternate on the stems; the flowers are large, violet colored and are borne singly, opposite the leaves. The fruits are variable in shape, color and size and are ready to use when one-third grown, continuing to be edible until fully mature. When the seeds begin to harden, the flesh loses its tenderness and delicate flavor. The fruits are usually sliced and fried.

Egg plant is always to be had in the Armenian restaurants in New York, who specialize in cooking it in a delicious manner. It is also served especially well by French, German, English and Italian chefs.

There are serpentine forms of egg plant having long, slender fruit. Dwarf varieties produce small fruits and do not require as long a season as the common variety.

Egg plant is extremely tender, requiring higher temperature than any other vegetable grown in this country and except in the South or where the season is long, special care must be used to develop a crop.

Soil.—Warm sandy soils are preferable. The soil should be rich, deep and well drained. A liberal quantity of decaying vegetable matter is required to insure best results. There should be no lack of moisture and the plants should not be checked in growth from any cause.

In the North, the seed is sown in greenhouses or hotbeds. In the South cloth or glass covered hotbeds are used. Sow the seed 8 to 10 weeks before the plants are to be set out, transplanting once before they are set in the field. Use pots or other individual containers, so there will be as little disturbing of the roots as possible, to prevent any check in growth, which causes hardening of the tissues, resulting in a decreased yield of smaller fruit. The plants should not be set in the field until the weather is warm. In the North this should not be before June first.

A temperature of 65 degrees F. should be provided for germination, and from 65 to 75 should be maintained until the plants are sent to the field.

Set the plants 2 to 3 feet apart, in rows 3 to 4 feet apart.

One hundred and twenty to one hundred and sixty days are required to produce a crop.

Fertilizing.—Vigorous early growth and strong foliage are important. Where manure is obtainable it is used heavily, supplemented by 500 to 1,000 pounds of high grade fertilizer containing the nitrogen in quickly available form, applied before the plants are set. As soon as the plants are set, apply a top-dressing of nitrate which may be repeated once or twice to insure steady, vigorous growth. Leunasalpeter, on account of its sustained action, is particularly suitable for egg plant.

Cultivation.—Cultivation should be frequent to keep down all weeds and to conserve moisture. When the weather is hot, mulch the plants with straw to retain moisture in the soil.

Marketing.—Large, well shaped fruits without blemish are the most attractive and bring the best price, so they should be handled carefully to avoid bruising. Fancy fruit is wrapped in paper printed with the name and address of the grower.

Under favorable conditions two to three good fruits to the plant give a satisfactory return. The production of fruit can be limited by removing the flowers. Careful grading, wrapping and packing will insure the best market price.

Varieties.—There are three colors of egg plant: black, purple and white. White varieties are grown only in home gardens as there is no market demand for them.

Black Beauty is the earliest and best of the large fruited varieties. The plants are well rounded and sturdy, bunching freely. The fruits are large and of good color, setting freely and developing rapidly.

New York Improved. The plants of this variety are larger and stronger than Black Beauty and keep the fruit off the ground better, producing the fruits in good quantities. They are dark purple, large, nearly round, free of thorns and of good quality.

Florida High Bush bears dark purple fruit, uniform and of good size. The plants are strong. The fruits are borne high up on the plants so the sun does not blight the blossoms.

This variety is rather late for the North but is good for the South.

Early Long Purple is one of the hardiest. The fruits are from 6 to 8 inches long and 2 to 3 inches in diameter, of deep purple. Adapted to cool sections where other varieties do not do well.

An ounce of seed will produce from 1,000 to 2,000 plants.

Diseases.—With good seed and good culture, the eggplant is fairly free from disease. Wilt is sometimes troublesome, causing a wilting and yellowing of the foliage. The plants make a stunted growth and die. Crop rotation is the control measure.

Bacterial wilt is the same as bacterial wilt of tomato.

Fruit Rot, Leaf Spot, Stem Blight. A fungus disease which attacks any part of the plant. Brown spots appear on the leaves, the centers of the spots becoming gray and the margins black. Gray or brown spots appear on the fruit, followed by decay. This disease causes damping off of the seedlings.

Seed should be soaked for ten minutes in corrosive sublimate solution 1 to 1,000. Rinse the seed in running water for fifteen minutes after soaking in the poison solution. Remember this is a deadly poison. Clean soil should be used in the seed bed and the crop rotated.

Insects.—The flea-beetle is likely to be troublesome, particularly when the plants are small. The treatment is dipping the plants in a 3-3-50 Bordeaux mixture, that is, 3 pounds copper sulphate, 3 pounds lime and 50 gallons of water, when transplanting and about ten days later, spray with a 4-4-50 Bordeaux to which has been added 4 pounds arsenate of lead.

EGG PLANT

Potato Bug or Colorado Potato Beetle is often injurious to egg plants. See control under Potato.

Tortoise Beetle is troublesome in the South and sometimes appears in the North. The larvae and adults eat holes in the leaves. Spray with arsenate of lead 1 pound to 50 gallons of water.

Lace Bug. This insect sucks the plant juices. Spray with nicotine sulphate, 8 ounces to 50 gallons of water or fish oil soap, 8 pounds to 50 gallons of water.

ENDIVE

Endive is grown by market gardeners near large cities, and the demand is increasing. It is used as a salad.

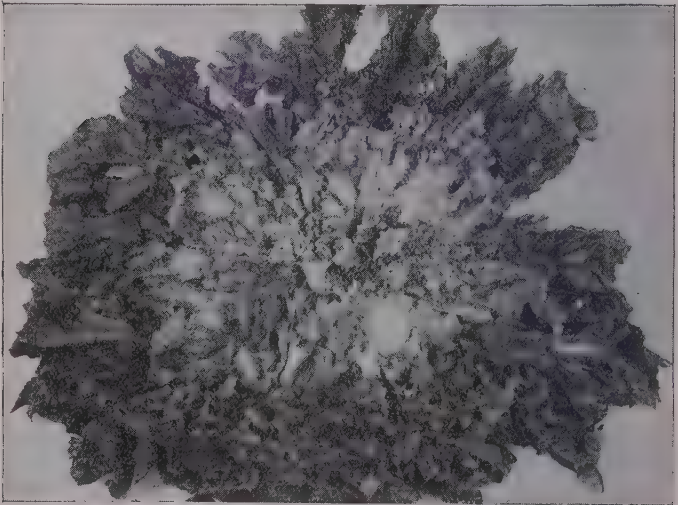
ENDIVE (GREEN CURLED)

Endive is a hardy annual and the seed may be sown in the spring as soon as hard freezes are over. It is grown mainly for an autumn and early winter crop. For an early summer crop, the seeds are started under glass or sown very early in the open ground in the spring. For the late crop the seed is sown in July or August. The plants do best during cool weather and require 40 to 50 days to reach marketable size. In the South it is grown as a winter crop.

The leaves are ornamental and when blanched are used for garnishing, as salad for flavoring soups, and are also cooked as greens.

Soil.—Any soil that will grow a good crop of lettuce is suitable for endive. It should be rich and moist. Rapid growth is required to produce tender, crisp leaves. Nitrogen as a top dressing is desirable.

The plants are set one foot apart each way by some growers to allow for full development, others as close as 6 to 8 inches.



ENDIVE (BROAD LEAVED)

Blanching reduces the bitterness and makes the leaves tender. Excluding the light from the central leaves and keeping the heart dry to prevent rotting, is the process. The leaves must be dry at the time of blanching, and blanching should be no faster than the plants are used because of danger of decaying. Ten to twenty days are required for blanching.

The common plan is to tie the tops, bunching the leaves together. The same result is obtained by covering the plants with boards, straw, etc. After rain the plants must be exposed to the air to permit them to dry, otherwise they will rot. If blanching is done in a greenhouse, the temperature must be kept low and the air dry.

The plants may be lifted with earth left on the roots, resetting close together in a cool cellar, preserving the plants until midwinter.

Varieties.—There are two classes, the curled or fringed-leaved and the broad-leaved varieties. In the curled type, Giant Fringed, Green Curled Winter and White Curled are the popular varieties. Broad-leaved Batavian is used mainly for greens, in stews and soups.

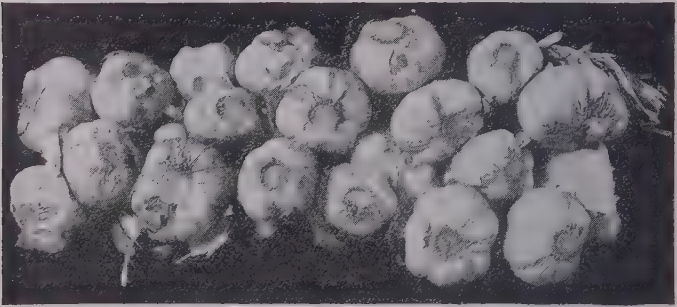
An ounce of seed will plant 300 feet of row.

GARLIC

Garlic is a perennial, a member of the onion family, but of much stronger flavor. The sale is quite largely confined to large cities. The bulbs are used for flavoring stews and soups.

Garlic produces a group of small bulbs, called cloves, covered with a thin skin. In the seed trade the cloves are called "sets." The sets are commonly used for planting. A considerable quantity of garlic is imported. It seems as though home production should be developed to supply the full demand.

Any soil that will produce good onions should produce good crops of garlic. In Texas, plantings are made in the autumn. In the North planting should be in the spring. The cloves, or sets, are planted in rows from 12 to 18 inches apart, and from 4 to 6 inches apart in the rows, covered with an inch or two of soil.



GARLIC (BRAIDED)

Cultivation, fertilization and general care is practically the same as for onions.

GARLIC—THREE VIEWS

When the tops are ripe, the bulbs are pulled and left on the ground to dry. The tops are then woven together forming strings of garlic bulbs four or five feet long, which are hung in a dry, airy place to cure.

Garlic properly used adds a wonderful flavor to some dishes which is greatly relished by epicures.

HORSE RADISH

Horse Radish is a hardy perennial which has escaped from cultivation and grows wild in some places. It is one of our most important condiments. The grated root, with a little vinegar added, is bottled and used as a relish with oysters and meat. Very thin, narrow slices served fresh are excellent with roasts.

When properly grown, the roots are long, conical at the top, branching below.

Soil.—Deep, rich, moist loamy soil is required to grow good roots. Moisture is essential and so also is drainage. On hard soils the roots are crooked and branched. The soil should be plowed deeply and thoroughly pulverized.

Planting.—Propagation is from root cuttings—from the side roots, trimmed off in preparing the roots for market. These may vary in size from one-quarter to a half-inch in diameter and from two to several inches in length. The longer the cuttings the better. The cuttings are trimmed square at the top and diagonally at the bottom so the planter may know which end is the top, in planting. The cuttings are then tied in bundles, packed in sand and stored in a cool moist place until spring. Some gardeners bury the cuttings in a well drained soil out doors.

The planting is done by making a deep furrow or using a dibber to make the holes in which the cuttings are placed, three or four inches under the surface. Firm the soil well.

The rows should be far enough apart to permit of cultivation

HORSE RADISH

and according to the method of cultivation, horse, tractor or hand. The plants may be set from 12 to 18 inches apart in the row.

Culture.—Thorough tillage should be given. Rapid root growth is made during the cool weather of early autumn.

Early in the season the side roots are sometimes removed when large, straight roots are desired, by removing the soil and taking off the side roots from the tops of the main root, after which the soil is replaced. This work must be carefully done and except in special cases, is not likely to be profitable.

Fertilizers.—A soil well filled with organic matter, such as green crops or manure, is best for horse radish. Five hundred pounds of acid phosphate to the acre will be beneficial, even on well manured land. When manure is not used, a ton of a 5-10-5 will be beneficial, that is 5 per cent nitrogen, 10 or even 15 per cent acid phosphate and 5 per cent potash.

Harvesting.—The roots are hardy and may be left in the ground over winter. Those wanted for autumn and winter market should be dug and stored, the remainder of the crop being dug and marketed as early in the spring as possible.

Harvesting is done in several ways, digging by hand, for small quantities, and by plowing out. The tops and side roots are removed, the roots washed, packed and marketed.

In storing, care must be exercised to prevent the roots from withering. Only hard, plump roots are salable.

In harvesting be careful to remove all the roots, as all that remain in the soil will grow and may become troublesome weeds.

SEA KALE

KALE

Kale or Borecole.—This is a popular boiling green for autumn, winter and early spring use. It tastes somewhat like spinach. It is hardy about as far north as Philadelphia. In more northern sections it should have protection, a covering of straw or something of like nature. If the snow is deep it will winter without additional protection.

Kale is grown on a large scale for market around Norfolk, Virginia. It is one of the cabbage family.

Any soil that will grow good cabbage will grow good kale, but a well drained sandy loam gives best results.

In the home garden a crop of spinach, Swiss chard and kale will give boiling greens over a long season.

Planting.—In the South, the seed is sown late in the summer or in the autumn. In the North the seed is sown as soon as the ground can be prepared in the spring. For the autumn crop the sowing is made in July or August, according to location and climate. Cover the seed about half an inch. For hand cultivation the rows are spaced 18 inches apart and for horse cultivation 30 to 36 inches. The plants are thinned to 6 or 8 inches in the rows.

Cultivation.—Give clean cultivation about the same as for cabbage and the same general care.

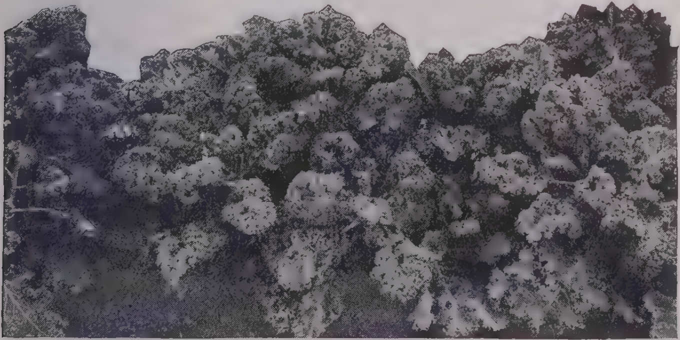
Harvesting.—The leaves are improved by freezing and for home use are picked from the plant. For market the entire plant is cut with a large knife. Any discolored or damaged

KALE OR BORECOLE

leaves are removed and the plants packed without washing in light, ventilated barrels or hampers.

Fertilizing.—Kale is a gross feeder and should be well fertilized, using a ton or more of a high grade fertilizer. Manure or green crops should be turned under to keep up the humus supply.

The Virginia Experiment Station found acid phosphate to be necessary for best results on kale and also lime, in addition to potash and nitrogen.



KALE OR BORECOLE

Varieties.—The low sorts are hardier than the tall. Imperial Long Standing is a beautifully curled and crimped sort, of strong, vigorous spreading habit, attractive bright green color, productive and hardy. Dwarf Curled Scotch has bright green curled leaves, tender and of good flavor. Blue Curled Siberian is a vigorous growing hardy variety of dwarf spreading habit, with bluish green foliage, curled and crimped at the edges. It stands longer than other varieties before running to seed.

One ounce of seed will plant 500 feet of drill and produce about 3,000 plants.

Insects.—Kale is attacked by the same insects as cabbage and the same treatments are used. For large fields a special sprayer should be used with the nozzles near the ground, arranged so there will be a nozzle each side of the row, spraying from both sides.

Sea Kale is not a true kale, but a perennial which should be grown and cultivated like rhubarb. The edible parts are the young, strong shoots that come up in the early spring. They are blanched, cooked and served like asparagus and the leaves are used as greens.

KOHL-RABI

Kohl-rabi is an excellent vegetable which will be better appreciated when better known. It is a member of the cabbage family and is sometimes called the turnip-rooted cabbage. It is superior to the turnip in flavor and keeping quality. It does not grow bitter and the flavor is more delicate than the turnip.

A large bulb is produced on the stem just above the ground. It is ready for use when from 2 to 2½ inches in diameter. The thick outer skin should be removed and the bulb cooked like turnips. A good way to serve is to cut in small cubes and boil until tender, serving with cream sauce.

Soil and Culture.—Any soil that will grow good cabbages will grow kohl-rabi. The soil should be made rich with manure or green manure and high-grade commercial fertilizer, a 5-10-5

KOHL RABI (EARLY PURPLE)

nitrogen, acid phosphate and potash, at the rate of half a ton to three-quarters of a ton to the acre.

The plants may be started in the greenhouse or hotbed for an early crop, but usually the seed is sown where the crop is to develop.

The seed is sown like radishes or carrots in rows 18 to 24 inches apart—or wider for horse cultivation. Thin the seedlings to stand 8 to 12 inches apart in the rows. Sowing two weeks apart will give a succession. An ounce will sow 200 to 300 feet of drill. The drills should be about one inch deep.

Cultivation is similar to cabbage or cauliflower.

Marketing.—Kohl-rabi should be harvested when from 2 to 3 inches in diameter, before it becomes tough. The root is cut off and the plants tied together in bunches like beets.

Varieties.—Earliest Erfurt is a white variety, short top. It is one of the best for outdoor or for greenhouse or hotbed culture. Tender and of good flavor. Early White Vienna has tender, white flesh. Early Purple Vienna is the same as White Vienna except that the skin is purple; the flesh is white—more resistant to heat than White Vienna.

Kohl-rabi may be stored in the same manner as other root crops.

LEEK

Leek. The leek is a popular vegetable in England, Scotland, France and Southern Europe and is slowly gaining headway in this country.

The leek is a member of the onion family, but unlike the onion it does not form a bulb, but a sheaf of leaves. The lower part of the sheaf is solid, and when well blanched is milder and more crisp and tender than the onion.

LEEK

Culture.—Soil and cultural conditions which apply to onions apply equally to leeks.

The seed may be sown in a greenhouse or hotbed, the young plants transplanted in the garden, in moist, well prepared soil. The seed may be sown in the open ground as soon as the bed can be made ready in the spring, in drills a half inch deep and a foot apart. The seedlings transplanted when 6 or 8 inches high, in rows a foot apart, 4 inches apart in the rows. The tops of the seedlings being clipped severely when transplanting.

The seedlings are planted from 4 to 6 inches deep in trenches, which are gradually filled as the plants grow. Be careful not to bank up the plants too early as they decay easily when young.

The seed may also be sown in August or September and the plants transplanted in the spring. An ounce of seed will sow from 100 to 150 feet of drill.

Leeks are marketed in bunches like green onions. They are eaten raw, mixed in salads, used for flavoring soups and stews. They are stored like celery in trenches, cold frames, pits and cellars.

LETTUCE

Lettuce, like many of our common table vegetables, has been cultivated for ages. The ancients were familiar with its cultivation and it is mentioned by their writers as far back as 500 B.C. This species, *Lactuca sativa,* has never been found in a wild state. It is related to *L. scariola,* one of our common weeds.

Lettuce is the most important salad crop grown in North America. The four leading producing states are: California, New York, Florida and New Jersey. It is also grown very largely around Norfolk, Virginia.

The discovery of vitamins and the part they play in maintaining good health, probably has increased the demand for lettuce, which is now found in the market at all seasons of the year.

A CRATE OF LETTUCE

It is grown in the open ground, in hotbeds, cold frames and greenhouses.

Lettuce thrives in a cool growing season. It is grown in the South in the autumn, winter and early spring. In the North it is grown in the spring and early summer and in the autumn. It is difficult to grow a good crop in the hot weather of summer, as it does not head well and goes to seed prematurely under unfavorable conditions. It is grown in the winter as a greenhouse crop.

In California it is mainly an autumn and winter crop, but along the coast is grown throughout the year.

There are three types of lettuce commonly grown: head lettuce, called botanically *capitala;* leaf lettuce, botanically *crispa* and cos lettuce, or romaine, botanically *longifolia*.

Soil.—Lettuce is grown commercially on all types of soil, but principally on sandy loams and drained muck land. Sandy loams are best for early crops. Good muck soil is excellent. Much muck soil is under cultivation for lettuce in New York, New Jersey and Michigan.

To grow good lettuce the soil should be deep, well drained and retentive of moisture. The soil cannot be too thoroughly and too carefully prepared. Lettuce has small roots which have to take care of a large amount of leaf growth.

The soil is plowed and disked, followed by a thorough harrowing. On muck soils a light roller is used in place of a harrow. The surface should be fine and smooth.

Climate.—Lettuce is a cool weather plant, standing cold better than heat. When properly hardened, young lettuce plants will stand lower temperatures than cabbage. Properly hardened plants will stand a drop in temperature, if not of too long duration to 12 or 15 degrees F. A matured crop is more easily damaged by freezing.

Varieties have been perfected which now permit lettuce to be grown throughout the year in the North. As far north as Norfolk, young plants are wintered without protection.

Fertilizers.—For lettuce the soil should contain a liberal amount of humus. Either manure or green crops turned under, not only for the plant food thus obtained, but for improving the physical structure of the soil. Rapid and unchecked growth is necessary to produce good lettuce; vegetable matter in the soil helps to retain needed moisture. If the soil is dry, growth will be checked and a poor crop will result.

Market gardeners use 15 to 20 tons of stable manure to the acre, where it is to be had.

Where green manure is used, a half a ton to a ton of high grade fertilizer per acre should be used, 5 per cent nitrogen, 6 to 10 per cent phosphoric acid and not more than 4 per cent potash. On muck soils use 2 to 4 per cent nitrogen, 8 per cent phosphoric acid and from 4 to 6 per cent potash.

If more than half a ton of fertilizer is used, it should not contain more than 4 per cent potash.

The fertilizer is usually broadcast before the crop is planted. one or two applications of nitrate of soda are made while the crop is growing, at the rate of 100 to 200 pounds per acre, to keep the crop growing rapidly. Sixty to 100 pounds leunasalpeter will serve the same purpose.

Starting Early Plants.—Formerly seed for early spring plants was sown in the open ground the latter part of September or earlier in some localities. The seedlings were transplanted in cold frames in October and wintered like cabbage plants. They were set in the field the following spring.

The customary method now is to sow the seed in a greenhouse or hotbed, 8 to 10 weeks before the plants will be wanted for field planting. The young plants are transplanted when 3 weeks old, into flats, set 2 by 2 inches. The plants are hardened off in cold frames and are handled quite like cabbage.

The soil for the seed bed and for transplanting should abound in vegetable matter and contain sufficient sand to insure good drainage. Compost, such as florists use for potting soil, two parts and one part sand and one part thoroughly rotted manure will make good soil for the purpose. A sprinkling of commercial sheep manure over this mixed soil and thoroughly mixed and permitted to stand for a day or two, will make an excellent soil, the sheep manure taking the place of rotted manure.

Mice are fond of the tender seedlings and English sparrows, where they are numerous, are likely to destroy seedling lettuce plants, if they can reach them.

The seedling plants should be thoroughly hardened before they are set out in the field.

Field Planting.—The soil having been well prepared and the plants thoroughly hardened, the plants may be set as soon as hard freezes are over. In the North seed is sown at intervals during spring and summer and in the South, during autumn and winter.

A seed drill is usually used where the seed is sown in the field in rows 12 inches apart or a little wider spaced; 2 to 3 pounds of seed used to the acre. An ounce to about 150 feet of drill.

For horse cultivation the rows are placed farther apart, requiring less seed per acre.

The plants are thinned to 8 to 16 inches apart, depending on the variety, productiveness of soil, etc. Do not delay thinning, as crowding will produce poor, spindling plants.

Plants set out are spaced the same as for plants grown from seed in the field. The plants should be watered immediately when set, if the soil is dry. A dark, damp day is an ideal time for transplanting.

Cultivation.—Land for lettuce should be free from weeds to save expense of weeding while the crop is growing. Lettuce plants are too delicate to compete with weeds. The weeds must be kept down in the rows with wheel hoes and hand hoes, using the knife attachments rather than the cultivator teeth. This treatment cuts off the weeds and keeps a mulch without injuring the delicate lettuce roots which are close to the surface. If there are no weeds and the surface soil is loose, no cultivation will be needed. Hand weeding is necessary between the plants in the rows.

Irrigation.—Lettuce is a crop greatly benefited by irrigation. Crispness and good quality depend upon rapid growth and growth is dependent on soil moisture. Under irrigation the plants develop quickly and are solid and tender.

Harvesting.—Head lettuce is harvested when of full size, with solid heads.

Leaf lettuce, when grown for home use is gathered as soon as the plants are large enough to use. The plants are thinned by using the largest, leaving the smaller ones to develop.

Leaf lettuce for market is permitted to grow to full size, unless a high market price warrants earlier harvesting.

Lettuce is harvested by hand, using a long knife, cutting the plant just above the surface of the ground.

LETTUCE (COS)
Express Cos White Paris Cos Giant White Cos

Marketing.—Before packing, lettuce is trimmed to remove any dirty, torn or diseased leaves and is quickly separated into grades.

If crates or boxes are used for shipping, the bottom layer is placed with the stem end down and the others with the top down, as they carry better in this way. With baskets and hampers the packing may be done in the same way or all the heads can be packed stem down, with the heads up on the top layer.

There is no standard container, many types being used. Crates are best for head lettuce as the lettuce is shown to best advantage.

Storing.—Lettuce arriving in good condition can be kept for fully three weeks at a temperature of about 32 degrees. This is sometimes important as the market may be glutted just at harvesting time. In a week or two, market conditions may be improved.

Varieties.—Dr. Will W. Tracy of the U. S. Department of Agriculture classified lettuce varieties as follows:

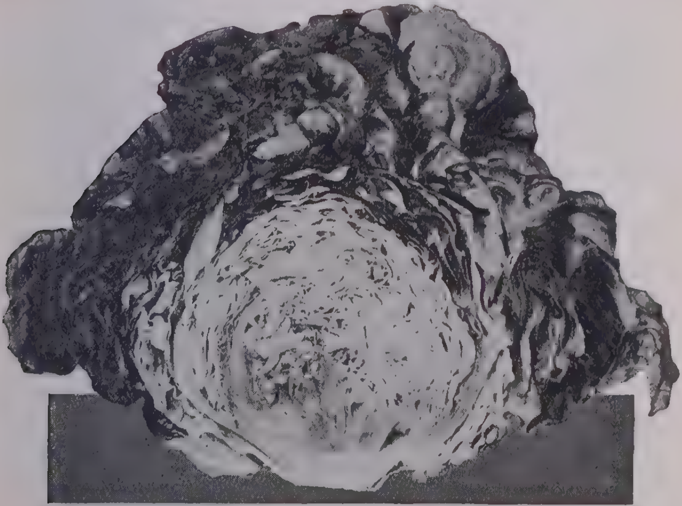
Class I. Butter varieties.
Subclass I. Cabbage-heading varieties.
Color Division I. Plants wholly green, Philadelphia Butter, Black Seeded Tennis Ball, etc.
Color Division II. Plants tinged brownish, larger part green. California Cream Butter, Big Boston, White Seeded Tennis Ball, etc.
Color Division III. Plants brownish, small portion only greenish. Brown Head, Eureka, Sugar Loaf.
Subclass II. Bunching varieties.
Color Division I. Plants wholly green. Oak-leaved, Earliest Cutting, Golden Heart, Lancaster.
Color Division II. Plants brownish.

Class II. Crisp varieties.
Subclass I. Cabbage-heading varieties.
Color Division I. Plants wholly green, Brittle Ice, Hanson, New York.
Color Division II. Plants tinged with brownish, large part greenish. Density, Iceberg, Marblehead, Mammoth.
Color Division III. Plants brownish, small part only greenish. Chartier, Mignonette, Sugar Loaf.
Subclass II. Bunching varieties.
Color Division I. Plants wholly green. Black-seeded Simpson, Boston Curled, Grand Rapids, White-seeded Simpson.
Color Division II. Plants brownish, small part only greenish. American Gathering, Chartier, Prize Head.

Class III. Cos varieties.
  Subclass I. Spatulated-leaved varieties.
    Heading Division I. Self-closing.
      Color Division I. Plants wholly green. Dwarf White Cos, Express Cos, Giant White Cos, Green Cos, Paris White Cos, Prince of Wales Cos.
      Color Division II. Loose-closing. Bath Cos.
  Subclass II. Lanceolate-leaved varieties. Asparagus.
  Subclass III. Lobed-leaved varieties. Asparagus Lobed-leaved.

LETTUCE

Big Boston is more largely grown than any other butter variety. The head is large and compact and is used for forcing and in the open ground. It is largely grown on muck land. It heads well in cold weather and is not injured by slight freezing. Does not do well in hot weather.



LETTUCE (BOSTON HEAD)

Green Leaved Big Boston, black seeded, is the most heat-resisting variety of this type.

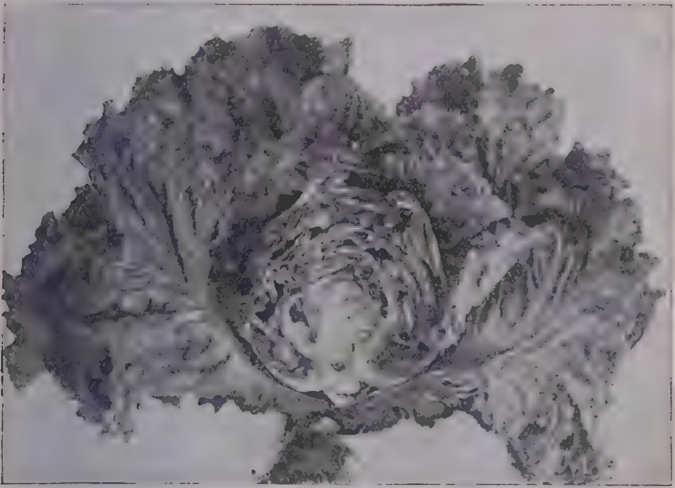
Cream Butter is the largest and latest of the early varieties of this type. Produces a large white head and withstands heat. The interior is golden yellow: Quality fine.

Deacon was originated in New York State. The leaves are smooth, thick and tender and inside, the heads are nearly white and of fine quality.

LETTUCE (WHITE PARIS COS)

Wayahead produces good hard heads. The outer leaves fold tightly and are light green. The heart blanches yellow.

In the crisp varieties Hanson Improved is grown largely for local market. The head is round, well formed and so solid it blanches almost white.

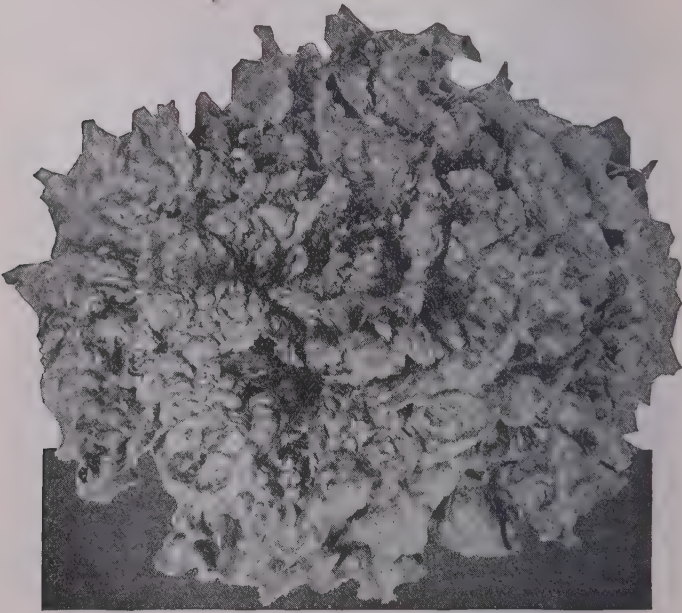


LETTUCE

New York is offered under many names, such as Wonderful, Los Angeles, etc. It forms large, perfect heads. The outer leaves are rich, dark green and the heart blanches well. The quality is excellent, being rich and tender. This is a popular shipping variety largely grown in the West.

Iceberg is one of the best of the large heading varieties to grow in hot weather. A splendid crisp-head sort. This variety and New York are sold in the markets of the East as "Simpson" lettuce and are so listed on menu cards of restaurants.

Of course it is not Simpson and should not be called by that name.

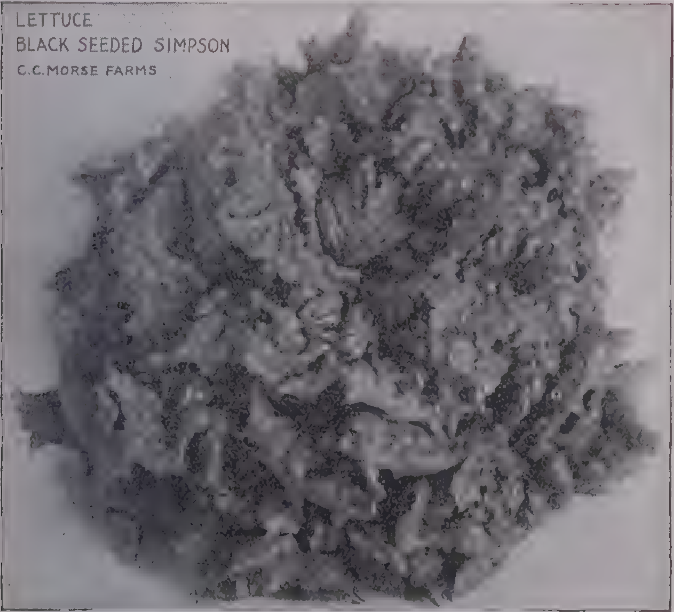


LETTUCE (BLACK SEEDED SIMPSON)

Among the leaf varieties Grand Rapids is the most popular for greenhouse, hotbed or garden. It develops quickly and its upright habit permits close planting. It keeps well and ships well.

White Paris Cos or Romaine is the best for hot weather.

Insects.—Lettuce is not troubled much with insects, except aphis or plant lice. Dusting with hydrated lime containing 2 to 3 per cent. nicotine is the remedy, or spraying with nicotine sulphate spray —3/8 pound of nicotine sulphate (40 per cent.) and 2 pounds of soap to 50 gallons of water. This is 1 part nicotine to 1,000 parts water.



LETTUCE (BLACK SEEDED SIMPSON)

The cabbage looper also attacks lettuce. See cabbage for control.

Cutworms are sometimes troublesome early in the season. Poison bait is used, made of 20 pounds bran, 1 pound arsenate of lead powder, 2 quarts molasses, 3 oranges or lemons and

4 gallons water. Mix the dry material thoroughly. Squeeze the juice of the lemons or oranges in the water and mash up the pulp and skin and add that also. Then add the molasses and mix thoroughly. Add the water to the dry material to make it damp when thoroughly mixed, but do not have it sloppy.

LETTUCE (GRAND RAPIDS)

After the mash has stood for a few hours it is ready for use. Put it out late in the day so it will not dry out by night and scatter over the field, near the plants. This cannot be used safely where animals will get at it.

Diseases.—Lettuce is subject to a number of diseases which are not always serious, but under favorable conditions, if neglected, may cause serious loss.

Bottom Rot causes damping off of seedlings. On older plants rusty, slightly sunken areas will be seen on the leaf stalks where they come in contact with the soil. Sometimes the leaves or whole head may rot. Nothing can be done in the field, but in the greenhouse, soil sterilization is the preventative.

Anthracnose is first indicated by lesions on the leaves, appearing as water-soaked spots, becoming brown. Later holes appear in the leaves. On the midrib the spots are sunken. Rotation in the field is the remedy. In greenhouses cleaning up thoroughly and a high temperature will be helpful.

Drop. Plants become water-soaked and rot quickly. This disease is widespread and causes serious losses. Prompt removal and burning the affected plants, thoroughly soaking the soil with a solution of copper sulphate is the remedy. In greenhouses, soil sterilization will control this disease.

Gray Mold is rarely troublesome in field culture. In greenhouses the remedy is care in watering and ventilating.

Mildew is another greenhouse difficulty, kept under control by watering properly and properly ventilating and heating.

Mosaic is troublesome in the South. The disease is carried by insects, so the control is to protect the plants from insects with nicotine or other insecticides.

Tip-burn is shown by blackening of the edges of the leaves and it may also be found on the inner leaves. It is seldom troublesome, except in hot weather. An excess of potash is favorable to this trouble and very likely excess nitrogen may also favor it. As yet there are no control measures, except to fertilize cautiously.

MARTYNIA

MARTYNIA

Martynia or Unicorn Plant is a native of southwestern United States. It is grown in home gardens as a curiosity and the young, tender fruits or seed pods are used for pickling. The plants are about 2 feet high, with a spreading habit.

The plants are tender and do best in warm soils with a sunny exposure. In the North the seeds should be started in the house, hotbed or greenhouse. In the South, the seed is sown in rows 3 feet apart, thinned to stand 24 inches apart in the row.

Martynia requires about the same general culture as okra.

MINT

Mint.—Peppermint and Spearmint. Peppermint is used in medicine and confectionery and for seasoning. Spearmint is used as a flavoring herb.

The plants are propagated from seed, cuttings or divisions of the roots. Moist, fertile garden soil will grow good plants.

Seeds are sown in shallow drills 12 to 18 inches apart and thinned to 4 inches apart in the rows. Unless kept in check, the plants spread becoming a solid mass of plants.

MINT
Mentha Spicata

MUSHROOMS

Mushrooms require a temperature in winter which does not fall below 53 degrees F. and does not go above 60 degrees. Heat is more injurious than cold.

Mushrooms can be grown in cellars or basements and these are the usual places for growing them on a moderate scale. They are also grown in sheds and barns which are not too cold in winter. Mushroom growing is carried on quite largely commercially, around Kennett Square, Pennsylvania, and sheds are used for the purpose.

For small plantings, beds can be made on a cellar floor, against a wall. Three or four feet from the wall, a plank a foot or more in width is stood on edge and held in place by uprights, making a box of the desired width and length.

Mushroom beds can be made in tiers, two, three or four beds, one above the other to make the most of available space. This is the custom in mushroom houses built for the purpose. The raised beds are supported by uprights, to which cross pieces are nailed, upon which the floors of the upper beds are laid. The posts or uprights must be large enough and close enough together to support the weight. The floors of the beds are of one inch material or thicker. A space of two feet should be left between the top of one bed and the bottom of the one above it. Do not build the beds higher than convenient to work from the floor.

Making the Beds.—Horse manure is the best material for growing mushrooms. That is, it is the best material we know of now. Possibly other material equally as good will be found. A little straw is desirable in the manure, but a large percentage of long straw is objectionable and should be removed. Shaving manure is not nearly so good as straw manure.

Fresh manure is put in piles three or four feet deep, under

MUSHROOMS CAN BE GROWN IN CELLARS OR BASEMENTS cover, first mixing with it one part of good, rich garden loam to four or five parts of fresh manure. This keeps the manure from drying out and from overheating and burning, which is very injurious. Manure with soil gives better results than manure alone.

MANURE IS THE BEST FERTILIZER FOR MUSHROOMS

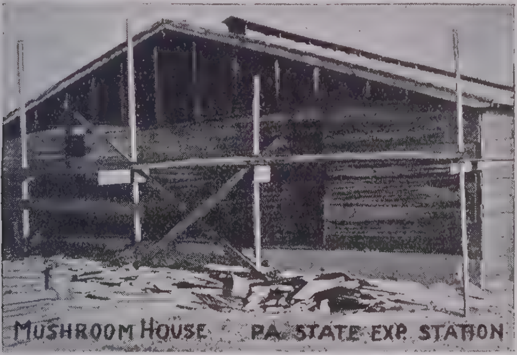
As soon as the manure begins to ferment, it must be forked over, making a new pile to prevent its becoming too hot. Shake the material slightly in handling. If the manure does not get dry and turn white it is in good condition. Give a second turning over in from five to seven days. If the weather is warm, daily turning may be necessary to prevent overheating. Manure that is well pressed down and moist will not burn as readily as dryer material and the tendency to sour is less. If the manure becomes dry, sprinkle water on it to moisten it, but do not make it wet.

MUSHROOM GROWING IS A SPECULATION FOR BEGINNERS
Although in some sections as in Kennett Square, Pa., it is a regular business.

From ten to eighteen days are required for manure to cure. It is not put into the beds until the temperature of the pile has gone down to 90 or 85 degrees. By this time all objectionable odor should have disappeared and what mushroom growers call a sweet fermentation begun.

Preparing the Bed.—A layer of the coarser, more strawy manure is placed on the bottom and thoroughly and evenly tramped or pounded down. Additional layers are put on, each layer packed firmly and evenly, until the bed is from ten to fourteen inches thick.

The temperature of the bed is likely to rise for a few days after it is made. It will then decrease. A thermometer is kept in each bed with its base several inches below the surface. When the temperature falls to 75 or 70 degrees, the mushroom spawn may be planted.



Planting.—Mushroom spawn, in the form of dried bricks can be obtained from seedsmen. This is broken, cut or sawed into pieces about two inches square. These are planted about two inches deep, eight to ten inches apart. The material is packed firmly over each piece of spawn and the whole bed pressed into shape.

A new form of spawn is now quite generally used and gives better results than the brick spawn. It is put up in quart milk bottles.

When planted, the bottles are broken and pieces of the spawn about the size of a walnut are planted a foot apart and half an inch deep, firming gently but without pounding. The temperature of the bed should be between 65 and 70 and not above 75 degrees. One bottle will cover about forty square feet or sufficient to plant forty pieces. The spawn in bottles is very perishable. The bottles should be kept at a low temperature and not broken until planting time.

Bottle spawn may be kept for a year at an even temperature of 32 degrees. It is kept in the egg rooms of cold storage plants where a uniform temperature of 30 to 32 degrees is maintained.

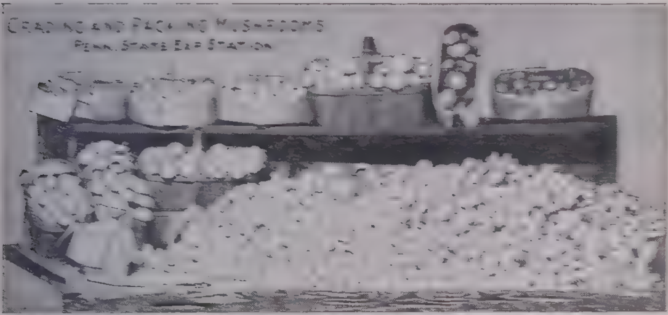
In purchasing bottle spawn the dealer should know when the beds are to be planted so the spawn may arrive at just the time it is wanted.

If conditions are favorable, the beds should not be watered for several weeks after spawning, or until after they are cased. If they dry out rapidly and watering is necessary, apply only a little as a surface spraying. Heavy watering will kill the spawn. After spawning the bed may be covered loosely with straw or excelsior, to retain moisture and prevent too rapid fall of temperature. This is removed before casing the bed.

Casing.—In a week or ten days after planting, if the spawn is developing or running into the manure, the beds should be cased. This consists of covering evenly, with an inch or an inch and a half, of slightly moist loamy soil, which has been screened to remove stones, lumps and trash. Casing retains the moisture and temperature necessary to growth and it provides a clean material for the mushroom stems to form in. After casing, if water is needed it is applied with a sprayer in a fine mist, to prevent the bed drying out.

Watering.—After the mushrooms appear it may be necessary to water the beds occasionally. This should always be done by light sprinkling, never soaking the beds. Apply the water after harvesting. Mushrooms should begin to appear six to seven weeks after casing.

Harvesting.—The mushrooms should be harvested every day, when the bed is bearing. Pull the mushrooms with a slight twisting motion when the cap begins to flatten out and just before the veil covering the gills on the underside of the cap bursts. Fill the holes in the bed with fresh soil as soon as the mushrooms are harvested.



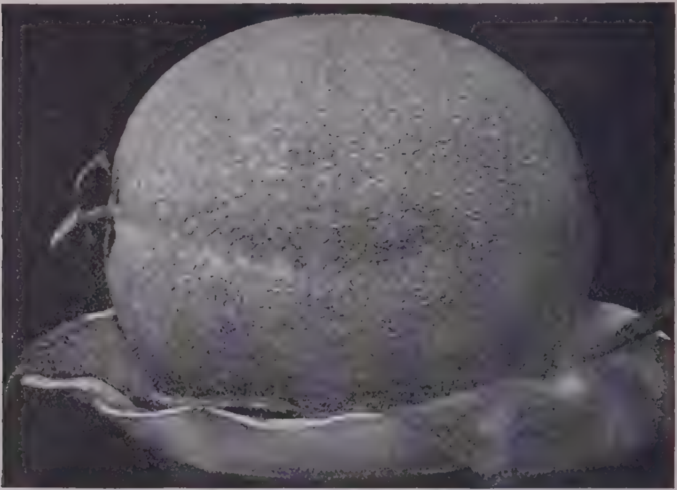
MUSHROOMS ON PACKING TABLE SHOWING VARIOUS SIZES
Various grades are shown in basket at rear of table. Two baskets on right are brown strain

One pound to the square foot is a good average crop, although yields of double this quantity are sometimes obtained. Only one crop a year is secured from a bed or house.

Mushroom growing, particularly for the beginner, is a speculation, although the growers around Kennett Square, Pa., and some other places raise crops regularly every year. There are probably a larger percentage of failures by those who try to grow mushrooms than with any other food crop.

The principal causes of failure are poor spawn; improper handling of manure; poor manure; temperature of beds too high or too low; improper watering and improper temperature conditions.

The manure and soil from the spent mushroom beds makes an excellent top dressing for gardens.



MUSKMELON (KING GEORGE V)

MUSKMELON (ROCKY FORD)

MUSKMELON

Muskmelon.—In the endeavor to do the unusual, muskmelon is given on menu cards as cantaloupe, although it is muskmelons that are served.

Cantaloupe is a variety of muskmelon bearing the name of a castle in Italy, where they are supposed to have first been grown in Europe, being native of Armenia.

During its season, muskmelon is a favorite breakfast fruit with which to start the morning meal, and it is also largely used as a dinner dessert.

Muskmelons come in to the New York market in June and are to be had until autumn.

Muskmelons are grown in home gardens, in market gardens and as a truck crop in the eastern, southern and western states. The acreage is large in New Jersey, Maryland, Delaware, California, Arkansas, Colorado, Arizona, Georgia, Virginia and Texas. The 1920 census gives the value of the crop at $10,766,591.

Muskmelons thrive in a hot dry climate. In dry sections they are grown under irrigation, the supply of moisture being under control.

Botanically the muskmelon is *Cucumis Melo*, of the same genus as the cucumber, classed as follows:

Reticulatus.—Netted melons, small fruit with netted and ribbed surface. All of the muskmelons in the United States commonly grown are of this variety or Cassaba melons.

Cantalupensis.—Cantaloupe melons. Fruit warty, scaly and rough with hard rinds. This type is rare in the United States.

Inodorous.—Cassaba or winter melon. Fruit has almost no musk odor. Smooth rind. The fruit ripens late and keeps well into the winter.

Flexuosus.—Serpent melon, with long slender fruit from one to three inches in diameter and sometimes three feet long. Grown usually as a curiosity, though it may be used for preserving.

Dudain.—Fruit about the size of an orange and very fragrant. Grown for ornamental purposes.

Chito.—Called lemon cucumber, orange melon, etc. Fruit about the size of a lemon. Used for preserves.

Climate.—Muskmelon is more tender than either cucumber or squash and will stand less cold. Do not start in the open until the ground is warm.

Fruit shipped from long distances ripens in transit or in the market. When grown near the market, the fruit can ripen on the vines and the flavor will be superior.

Soil.—Muskmelons may be grown on any soil that will grow good vegetables. Sandy soils produce early crops of good quality. A fairly liberal amount of moisture is required during the growing season to produce vigorous vines which will bear fruit of good size and flavor. At the same time, thorough drainage is also necessary.

Land which has been heavily manured the previous year for other crops makes good soil for muskmelons. Plow early and harrow frequently to prevent drying out before planting time.

Fertilizers.—Muskmelons thrive in a soil containing a liberal amount of vegetable matter. The best results are obtained from well rotted manure applied in the hills. Where manure cannot be had, green crops turned under, preferable legumes such as clover or soybeans, are used to supply the vegetable matter, supplemented by commercial fertilizers. A 4-10-8, 4 per cent nitrogen, 10 per cent phosphoric acid and 8 per cent potash, used at the rate of 1,000 pounds to the acre in addition to the green crops, will give good results on many soils. Different soils may require varying this formula somewhat. On a sandy soil, deficient in potash, this formula will give good results. On clay soil not more than 4 per cent of potash may be needed. The quantity needed may vary from 500 to 2,000 pounds of high-grade complete fertilizer.

Where as little as 500 pounds to the acre is used, it is usually applied in the hill. Where 1,000 pounds or more is used, broadcasting is the method.

Some growers apply about half the fertilizer before planting and the balance after the crop is well started. Others apply the full amount before planting.

Seed.—The very best seed obtainable should be used, as the plants produced depend largely upon the quality of seed. Strong, vigorous, productive, disease-resistant plants can only be had from good seed.

Growers are inclined to save seed from a particularly fine muskmelon or watermelon in an endeavor to continue so doing and thus breed up a superior strain of their own. The idea is commendable but the theory is not entirely sound.

The start should be made with the plants in the field, selecting a strong, healthy, unusually productive plant. Save the seeds from the best fruits of plants of this kind and continue the operation year after year.

Starting Early Plants.—To obtain an early crop in the North and in sections having a short growing season, plants may be started in greenhouses, hotbeds or cold frames. The seeds are planted in pots or plant bands. Muskmelons do not transplant well and will not stand having their roots disturbed.

Three or four seeds are sown in each pot and thinned to one or two when the seedlings are small.

The Canadian growers, celebrated for their Montreal market melon, are obliged to start melons under glass and protect the plants under sash for a considerable time and in other parts of the country plants are grown under glass until it is safe to set them in the field.

The custom in Canada is to sow the seed in a carefully prepared seed bed and to transplant the seedlings as soon as they are large enough to handle, into three or four inch pots.

The seed is sown by most growers in the United States, about four weeks before the plants are to be set out, in a very carefully made seed bed, with the soil made fine. Skillful growers are able to keep the plants under glass for six weeks, giving them two shifts, handling the plants very carefully and giving them plenty of room.

Careful attention must also be given to watering and ventilation. The day temperature should be about 60 degrees F. Not permitting the plants to be checked in growth for want of water nor by cold. Too much water may cause the seedlings to damp off.

MUSKMELON

Neither plants nor seeds should be placed in the open ground until the soil is warm and all danger of frost has passed.

Plants started under glass must be handled in a most careful manner, not disturbing the roots in the pots, nor the soil about them.

Plants in pots should be lightly watered a few hours before they are set out. The plants are removed from the pots by placing the hand over the soil in the pot, with the plant between the middle fingers, inverting the pot and tapping it gently so the ball of earth will come out intact. This is dropped into a hole previously made and earth is then drawn carefully about it, being careful not to crush the earth ball removed from the pot. The ball of earth and roots from dirt bands are removed by cutting the corners.

Field Planting.—Much of the crop of muskmelons is from seed sown in the field, either in hills or drills in the same manner as cucumbers. For drills, 2 to 3 pounds of seed is used per acre. An ounce will plant 50 hills, about 3 pounds to the acre. Hills are made from 4 to 6 feet apart. In drills the plants are spaced from 1 to 2 feet apart, the rows about 6 feet apart.

In each hill place a good big shovelful or two of well rotted manure and tramp it down firmly. Cover this with about 6 inches of soil. Place 8 to 10 seeds in each hill, in a circle, covering not more than an inch in heavy soil, nor more than two inches in light soil. Thinning should not be done until the plants are well started. Not more than two or three plants should be left.

Forcing boxes are used to good advantage by some growers for melons, squash and cucumbers. These are small boxes of varying sizes placed over the hills as soon as the seeds are planted. Some are of such a size that they may be covered with a single pane of glass and others are covered with a small sash having four lights of glass. Attention must be given to proper ventilation.

Cultivation should be shallow and frequent as long as it does not interfere with the vines. Hand hoeing is likely to be required. Do not disturb the vines, pulling the large weeds by hand when cultivation ceases.

Harvesting.—The time to pick depends upon the variety and the distance from market, also the temperature and manner of sending the fruit to market. For local market, harvesting is a simple matter, letting the fruit ripen, picking while still solid and firm.

Melons going to a distant market are picked before they are ripe. For long distances in cool weather or for short distances, the melons are picked when they separate readily and before, where they are to be long on the road to market. Experience only can teach when melons are ready for market.

Melons should be carefully handled when picked and packed and melons should be carefully graded and only uniform sizes packed. A variety of packages is used for packing muskmelons. The standard crate is 12 by 12 by 22½ inches. Climax baskets are common. Crates hold from 36 to 45 melons. Pack so that every melon touches the slats. The crate when covered should bulge slightly on all sides, otherwise the melons will be loose and damaged when the market is reached.

Varieties.—In selecting varieties there are several important considerations: the demand of consumers as to size and appearance, color of flesh and quality, earliness of fruiting, yield, and finally shipping quality, if for a distant market.

Varieties of the same kind may differ somewhat on different soils and in different climates. In the main the descriptions can be relied upon.

Rocky Ford is a strain of Netted Gem introduced by Burpee. The fruit is regular in size and form, not ribbed, green, evenly netted. The flesh is green and sweet, with small seed cavity.

Pollock.—Early. Solid netted type. Not ribbed; small, round; heavy yielder, good shipper, small seed cavity; thick, salmon tinted, delicious flesh, shading to green near the rind. Good keeper. Largely grown in the Rocky Ford district.

Extra Early Hackensack.—Heavy yielder of large fruit of uniform size, heavily ribbed and netted. The flavor is fine. A favorite in the New York market. The flesh is light green, thick. Good for local markets, but the fruit is too large to ship well.

Osage.—Fruits oval, medium to large. Dark green skin slightly ribbed and covered with shallow netting. Thick orange flesh, with small seed cavity. A good shipper.

Irondequoit is a wonderfully fine melon as grown on the light sandy soil around Irondequoit Bay, in Monroe County, New York. A fine yellow-fleshed melon. Vines hardy and productive. Fruit is large, 8 pounds or more, ribbed and netted. Rich salmon flesh, sweet, tender and thick with small seed cavity.

Bender's Surprise.—A large oblong melon, with light greenish-yellow skin and a light netting. Flesh is orange, of delicious flavor. Yields well. Splendid keeper and shipper. Popular with market gardeners.

Lake Champlain or Golden Champlain. This new melon is one of the earliest, maturing in from 70 to 90 days. Very productive. The plant is healthy and vigorous. The melons are of the Hackensack shape, of medium size, netted. The flesh is of golden yellow, thick and of good flavor. This variety is particularly desirable in latitudes where seed cannot be sown in the open ground until after the middle of May and a harvest is desired in August.

MUSKMELON (BENDER'S SURPRISE)

Montreal Market, Montreal Green Nutmeg, etc. The melons are almost round, flattened at the ends and deeply ribbed, heavily netted. The skin is green. The flesh is very thick, light green and very delicious. The fruits often weigh from 16 to 20 pounds. Skill is required to grow this melon.

Heart of Gold.—The round fruit is of uniform, medium size, ribbed and netted. Thick orange flesh of delicious flavor. Vines are vigorous, productive and free from disease

Cassaba requires a longer, warmer season than other melons. Largely grown in California and the West. The fruits are smooth, almost white. The flesh is green, thick and has a peculiarly sweet flavor. Should be stored two or three days before eating. Varieties are Cassaba, Honey Dew, Pineapple and others.

Forcing Melons.—**Royal Jubilee** or Diamond Jubilee is an oval, green fleshed melon. The skin is almost white, handsomely netted. The flesh is tender and of exquisite flavor.

King George.—Skin of straw color, evenly netted. The flesh is red, thick and of excellent quality.

In England, owing to the climate, muskmelons are produced only under glass, and English gardeners have become very skillful in their culture.

Melons in this country have been grown for years in the greenhouses on private estates, but greenhouse melons are not generally grown commercially. The melon is difficult to grow in the greenhouse, the expense is considerable and unless the fruit can be sold promptly when it matures, at a high price, the effort will not be profitable. The cultural requirements under glass are about the same as for cucumber, but much more exacting.

For fruit wanted by Christmas the seed must be sown not later than September 1. For spring harvest, seed is sown about December 1.

Soil.—The soil should be a compost, such as used for potting soil by florists. Add to this old sods which have been composted and chopped fine. Sods are also placed at the bottom of the beds. The soil should be mixed with a liberal amount of sharp sand, to keep it open and porous. Also a little thoroughly rotted manure. The soil in the beds should be made firm.

Melons require ample soil moisture, but over-watering must be avoided. Have the soil moist when the beds are planted and then sufficient to maintain normal, healthy growth until the fruits are formed, when a more liberal supply of water will be required. When the fruit has attained full size and ripening begins, less water will be needed, as at this time water is detrimental to the flavor of the fruit.

Muskmelons must not be checked at any time and wilting of the plants for want of water will be fatal.

A high humidity in the atmosphere is necessary, except when the flowers are being pollenized and when the fruit is ripening. Sprinkle the walks two or three times a day in clear weather and sprinkle the plants when necessary.

A uniform temperature of from 80 to 90 degrees by day and from 70 to 75 by night is required.

The flowers require hand pollination with a camel's hair brush. When the melons attain considerable size, they should be supported by a string net.

Growing Montreal Melons.—These have not been grown to any extent in the United States up to the present time.

The Vermont Experiment Station has experimented with them and the substance of a bulletin issued by that station on the Montreal melon is given below:—

Seed sown in greenhouse or hotbed from late February to early April. The young seedlings are early potted in 3 or 4 inch pots. When the weather is favorable they are removed to sash covered frames, where they remain until nearly fully grown. The frames are well constructed, exposed to the sun and protected from cold winds. In cold weather they are covered with two sets of sash, mats and board shutters. Horse manure is used to generate heat and the frames are banked with manure on the outside.

The soil is ridged up with a one foot center elevation. A trench is dug 2 feet wide, 18 inches deep, and filled almost level with well-fermented manure, and a portion of the surface soil thrown over it. The frames are then set in place and covered with sash.

When the soil over the manure is well warmed up, the warmest portion of some favorable day is selected for planting. Great care is exercised in transferring the plants from the hotbeds to the frames, to guard against setbacks from sudden changes of temperature or soil conditions. The plants now require closer care than before. Greater attention must be paid to watering, syringing and ventilating.

As the fruit attains size it is lifted from the soil and placed on a shingle or flat stone, to prevent cracking, rot, etc. Uniform shape, color and netting are obtained by turning the fruit every few days, a little to one side and then to the other.

When the runners fairly occupy the enclosed area, the frames are raised a few inches. More and more air is admitted until finally, when the melons are almost full grown, the sash and frames are removed.

As the fruit sets, its shoot is pinched off one or two inches beyond it. The frames used are 6 by 12 feet, covered with four standard hotbed sash. A 15 to 20 melon crop is considered sufficient from each frame. Three or four hills are planted, with two plants in a hill.

MUSKMELON (IRONDEQUOIT)

The average weight of the melons is from 8 to 15 pounds.

These melons are shipped from Canada by express to New York City in clothes baskets, packed in short, fine hay, without cover, by express.

Only when there is a market that will pay a high price for such melons will it pay to grow them. In the season Montreal melons are served in only a few of the higher class restaurants in New York. A slice only is a portion and a high price is charged for that.

Diseases.—Rust or blight is most troublesome in warm, rainy weather. Spraying with Bordeaux mixture is the remedy. Make the first application as the plants begin to vine, with subsequent treatment as a matter of protection.

Other diseases are the same as for cucumbers, subject to the same control.

Insects.—The melon worm is often injurious in the South and sometimes as far north as Michigan and New York. The adult moth has white wings with a brown band along the edges. The caterpillar is a mottled, greenish yellow, about an inch long. The larvae burrow in the rind and the fruit decays. The control measures are troublesome. Plant squashes ahead of the melons as a trap crop, or spray with lead arsenate, 3 pounds of paste to 50 gallons of water. Destroy all vines and waste fruit as soon as the crop is harvested.

All the insects which trouble cucumbers also attack muskmelons. See cucumber for methods of control.

MUSTARD

Mustard is one of the cabbage family. White mustard (*Brassica alba*) is grown for salad and greens. It is a hardy annual of earliest culture, thriving in rich, moist soils. The cool growing season is best suited for its development. Sow as early in the spring as the weather permits, in drills 12 to 15 inches apart and thin the plants. Successive sowings may be made every ten days until the weather becomes warm. For late autumn use sow three or four times in August.

MUSTARD

Fordhook Fancy is a vigorous grower with dark green leaves which curve outward. It stands the heat well.

Elephant Ear produces large, heavy leaves. Excellent for autumn use. In rich soil the leaves are 18 inches long, light green in color, with white ribs.

Giant Curled is a variety of *Brassica Japonica*, sometimes called Southern Giant Curled, popular in the South, where it is planted in the autumn.

Black Mustard, *Brassica nigra*, is grown for its seed which is used for making the mustard of commerce.

Mustard is frequently grown in the South as a trap for the harlequin cabbage bug. It is planted with the cabbage. The bugs prefer the mustard to the cabbage plants, collecting on the mustard plants, where they are killed by spraying with kerosene oil emulsion, early in the morning, before the bugs become active.

OKRA

Okra or Gumbo.—The botanical name of okra is *Hibiscus esculentum*, one of the mallow family to which our flowering hibiscus and the cotton plant belong. It is a tender perennial, growing best in hot weather. The young, tender pods are used in soups or stews. Chicken gumbo soup, properly made, is a delicious and nourishing food. The ripe seeds are roasted and ground and used as a coffee substitute.

In the South, three plantings are made at intervals of three weeks, for a succession. The plants will bear longer if the pods are picked while tender and none allowed to mature. The seed is sown in drills three feet apart and the plants thinned to 18 to 24 inches apart. A foot apart for dwarf varieties.

OKRA (WHITE VELVET)

Okra will thrive in any good garden soil, but does best in a light, sandy and warm soil. It should contain a fair amount of vegetable matter, manure or green crops turned under. Green manure should be fortified by applications of high-grade complete fertilizer at the rate of 500 to 1,000 pounds per acre.

In the North the plants may be started under glass, in pots or paper bands or on inverted sods. The roots must not be disturbed when the plants are set out in the field. They should not be set out until the ground is warm, when the plants will not be checked by cold. Give a sunny situation.

The seed may be sown in the open ground when the nights have become warm and the weather settled.

Cultivation should be shallow and frequent.

The seed pods develop rapidly and are the edible portion of the plant. They should be gathered daily and marketed in small baskets. The pods soon become tough and should be marketed or used quickly.

Kleckley's Favorite is one of the best varieties for market or home gardens. It is a vigorous grower, the plants attaining a height of nearly 3 feet. Smooth white pods are borne profusely all along the close-jointed plants. A heavy yielder of unusually good pods.

Perfected Perkins' Long Pod.—The pods are corrugated, 4 inches or more in length, deep green and of fine quality. Abundant bearer. This variety is preferred by many soup canners.

White Velvet.—Bears large, round and smooth, white pods of good quality. Plants about 3 feet high.

Dwarf Prolific.—Dwarf, stocky plants. Pods mature early. Heavy yielder. Pods are fibreless when young.

An ounce will sow 75 feet of row.

ONION

Onion.—The onion has been used for food for ages. It is grown on every part of the globe. It is not certain where it was originally found, but very likely in Asia. Some species are native of North America.

The onion has no stem as the stem is reduced to a plate from which the roots issue on the lower side, and the leaves from the upper side, the swollen overlapping bases forming the bulb. In Europe the tops or leaves are considered as valuable for food as the bulb and are used in salads and for seasoning.

According to the census of 1920, the value of the onion crop in this country was $21,387,221.

The states leading in production were: California, New York, Texas, Massachusetts, Ohio and Indiana, in the order named. In addition, onions are imported from Bermuda, Spain and other countries.

Onions are grown from seed, sets and top onions.

Climate.—Onions are grown over a wide range of territory, from Maine to Texas. The tender, foreign types are grown in Florida, Texas and California and in the North by starting them under glass, early in the season, transplanting to the garden when the weather is warm. Good results are obtained when sown in the open ground, if the season is favorable. The American varieties thrive in the North and in the South under proper culture. The Egyptian or top onion is hardy in the North without protection.

In the South, American onions are planted in the autumn and harvested in the spring. From 130 to 150 days are required to mature the crop.

Soil.—Onions are grown on the various types of soil, sandy, sandy loam, muck and clay. Clay soils must be very liberally supplied with vegetable matter to lighten it and lime to break it up. The seedlings are somewhat delicate and are unable to break through hard, dry clay soil that has not been put in good condition. Sandy soils should be made rich in vegetable matter such as green crops turned under, and then heavily fertilized. Sandy soils or muck well handled will give good results with onions. Soils of this type are easily worked and produce large, solid bulbs which keep well.

To insure success, soils for onions should be very carefully and thoroughly prepared, worked deeply, made fine and smooth. Muck soils are dragged and rolled before sowing the seed.

Unless the land is level, there is likely to be damage from washing. While the soil should be retentive of moisture, it must be well drained and should be free from stones and all rubbish which will interfere with the use of seed drills and the constant use of wheel hoes.

Fall plowing is the customary practice with onion growers. Before planting a field of onions, particularly if the land has been in sod, it should be plowed in the autumn and a crop of potatoes or corn grown and given thorough cultivation before planting the onions. This treatment will rid the land of many troublesome weeds and gives an opportunity to work in manure or other vegetable matter before the onion crop is planted.

Rotation is advised to reduce trouble with insects and diseases. Spring plowing for onions should be followed by constant harrowing to keep the moisture in the soil and to fine the soil to insure a good seed bed. Disking should follow plowing, then by the harrow, followed by a plank drag.

ONION FIELD IN BLOOM

While muck soils are excellent for onions, when first used they must be cleared, drained, plowed and left exposed to freezing, replowed in the spring and well limed. It may also be advisable to grow other coarser crops for a year or two before planting onions.

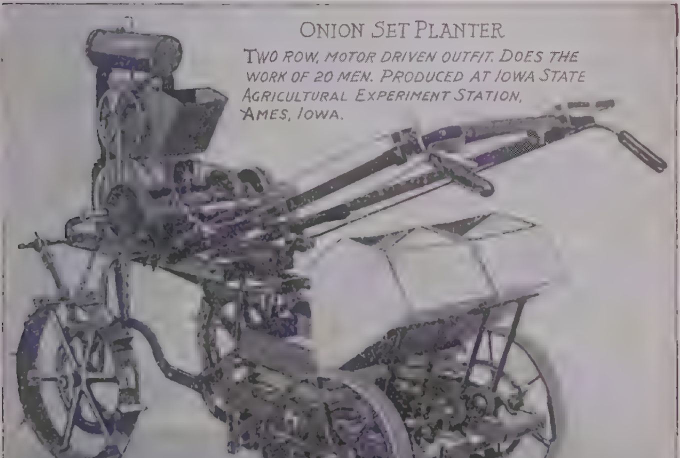
Fertilizers.—Onions require a well prepared and fertile soil. Stable manure is desirable because of its beneficial chemical effect on the soil as well as its fertilizing value. It should, however, either be applied heavily on a preceding crop or composted so as to be well decayed and all weed seeds decayed before it is applied to land on which onions are to be grown the same year. The land should, in this case, be plowed, the manure spread and disked in.

Poultry manure is excellent for onions where it has been carefully handled and not exposed to the weather, which would greatly decrease its nitrogen content. On muck soils chemical fertilizers are used and on other soils where manure is used, chemical fertilizers will be required. Manure is used at the rate of a few tons to the acre up to as high as twenty tons.

Where manure is used, 100 to 150 pounds of nitrate of soda or 60 to 100 pounds of leunasalpeter to the acre may be applied to give the plants a quick start. If chemical fertilizer is used without manure it should consist of about 4 per cent. nitrogen, 8 to 10 per cent. phosphoric acid, and 4 to 6 per cent. potash, applied at the rate of half to three-quarters of a ton per acre. Different soils may require somewhat different formulas. Good muck soils may need but about 200 to 300 pounds of muriate of potash to the acre. Phosphoric acid on muck soils at the rate of 500 pounds to the acre, increases the yield and improves the keeping quality of the crop. If nitrogen is used on muck soils for onions, it should be in a quick acting form, such as leunasalpeter or nitrate of soda, not more than 50 pounds of the former or 100 pounds of the latter, before the seed is sown.

Planting.—In the North, sets which are small onions grown from seed the previous year, are planted for green onions or dry bulbs, set out in the spring as soon as the soil can be prepared. The earlier the planting, the better the crop. They are not injured by light freezes. When top onions or multipliers are used, they are usually planted in the autumn. Seeds are sown in the spring, where the crop is to mature, as soon as danger of hard frosts has passed. In the South the seed and sets are planted in the autumn or winter, according to the locality or the type of onion grown.

The seed is sown with a drill where grown on an extensive scale and gang drills are sometimes used, sowing from four to six rows at a time. Six pounds of seed is used to the acre. More seed will be required in heavy soil than in light. Make germination tests before planting and allow about 14 to 16 plants to a foot of row.


ONION SET PLANTER
TWO ROW, MOTOR DRIVEN OUTFIT. DOES THE WORK OF 20 MEN. PRODUCED AT IOWA STATE AGRICULTURAL EXPERIMENT STATION, AMES, IOWA.

ONION PLANTS SHOULD BE SET LATE IN DAY OR IN CLOUDY WEATHER

Foreign onions such as Bermudas are sown in beds, using four pounds of seeds for an acre of bulbs. Onion sets are commonly sown by hand, but a planter is now made which is a great labor saver, but it may not set the bulbs as accurately as hand labor. Ten to fifteen bushels of sets are used to the acre. For green or bunching onions the sets are spaced an inch or two apart, while for bulbs they are placed 3 to 4 inches apart.

For bunching onions from seed, an average of 25 pounds of seed is used to the acre, sown in the open ground. The number of onions to the bunch depends on the market varying from 4 to 10.

Where wheel hoes are to be used, the rows are spaced about 14 inches apart. For home cultivation about 2 feet apart. In well prepared land, close planting will produce best results.

If the soil is heavy the seed should not be covered more than half an inch. Three-quarters of an inch in somewhat lighter soil and not more than an inch in sandy soil.

Thinning out onion plants is a tedious and expensive operation, so care should be taken not to sow the seed too thickly.

Transplanting Method.—Large varieties such as Prizetaker will produce largest specimens and heaviest yields, when the seed is started under glass and the seedling plants transplanted.

The seed is started six to ten weeks before the plants are wanted for setting out, in rich garden soil with good drainage. Drainage can be secured, if needed, by mixing sharp sand with the soil. Sow the seed in drills 3 inches apart, covering the seed a half inch deep. Ten seeds to the inch is sufficiently close. Give a moderate temperature. Eight thousand to nine thousand plants can be produced under a 3 x 6 hot bed sash. The plants set 4 inches apart, in rows 15 inches apart, will place 170,000 plants to the acre. Good care and watchfulness will

ONION (AILSA CRAIG)

be necessary to secure vigorous plants and to prevent the seedlings from damping off. When the tops are about five inches high, clip them back once a week, to keep the height down to four inches.

If the seedlings are properly hardened off, by carefully giving more air, lower temperature and less water, they may be set out as soon as danger of severe frost has passed.

Before setting in the field the tops are shortened to about three inches and the roots are trimmed back somewhat. Dibbers are used in setting the plants in beds which have been carefully prepared. The plants should be set during cloudy weather or late in the day, when the sun is bright. The soil should be moist or the plants watered as soon as set.

Large onions of this kind are marketed in crates.

Onion Sets can be used to produce green onions or dry bulbs where conditions are not wholly satisfactory for raising a crop from seed. The green onions for bunching mature quickly, also the bulbs, but the yield is usually smaller than from crops produced from seed under favorable conditions. Onion sets are produced from seed sown thickly the season before.

Egyptian or Top Onions do not produce seed but, instead, bear little onions on top of the leaf stems. These are gathered and planted in the open ground in the autumn. The plants are hardy in the North.

Potato or Multiplier Onions form a bulb from 2 to 3 inches in diameter. They form a cluster of underground bulbs of irregular shape, propagated from the bulblets, which soon form good sized onions. If allowed to mature, instead of a single bulb from each, seven or eight will be produced of various sizes. The strongest of these will produce a number of bulbs, while the smaller will grow into one large bulb. The larger the bulbs, the poorer they keep. Potato onions are largely used in the South.

Onion sets are generally planted in rows a foot apart and 3 inches apart in the row for bulbs and an inch apart for green or bunching onions. From 8 to 12 bushels will be required for an acre.

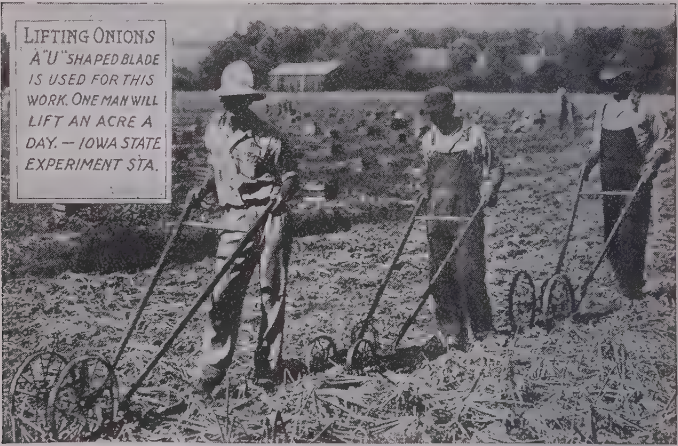
Do not use bulbs which are more than three-quarters of an inch in diameter, as they are likely to send up seed stalks. If too small they will produce weak plants. One-half to three-quarters of an inch in diameter are best.

Onion sets are produced chiefly in the vicinity of Chicago and somewhat in Ohio and Kentucky. The soil for producing sets should be sandy loam. The size of the sets is controlled by thick seeding.

The amount of seed to use for sets depends upon the fertility of the soil. On rich soils 100 pounds to the acre may not be too much, on medium soil 80 pounds, and on poor soils 50 to 60 pounds. The seed is sown by hand drills in single rows or in several rows an inch apart. Others use drills which spread the seed over rows 3 or 4 inches in width. The rows are about a foot apart. The culture is the same as for the regular crop.

Sets are harvested by first loosening them with an onion harvester attachment on a wheel hoe. They are gathered and placed in shallow trays made of slats. The trays of sets are left in the field from 12 to 24 hours and then piled up, with a three inch space between the trays, covered and left until dry. Then they are screened, and stored the same as large bulbs.

Some growers take the small bulbs or sets directly from the field to the storage house and spread them in ventilated trays where they remain until sold. The sets are cleaned by machine before they are marketed.


LIFTING ONIONS
A "U" SHAPED BLADE IS USED FOR THIS WORK. ONE MAN WILL LIFT AN ACRE A DAY. — IOWA STATE EXPERIMENT STA.

LIFTING ONIONS

The sets shrink in bulk about 25 per cent. from harvest until February, so it may be just as advantageous to sell when harvested instead of carrying the crop until winter, for better prices.

The average crop is about 60 barrels to the acre.

The onion set industry is a very important one. Sets are sold by seedsmen throughout the country.

Pickling Onions are grown in the same manner as sets, but less seed is used—25 to 30 pounds to the acre. The onions should measure from ¾ to 1½ inches in diameter and be uniform in size.

Seed.—It is of first importance in growing onions to obtain good seed. Price is hardly to be considered. The cost of producing a crop of onions is considerable, and it never pays to experiment with seed of a doubtful character. Know that the seed planted is of high germination, fresh, not more than a year old and produced from bulbs of superior quality. Buy only from a reliable, trustworthy dealer.

ONION FIELD AT PLANTING TIME FOR SEED. BRASLAN SEED FARMS

Some growers produce their own seed from selected bulbs of good size and shape and uniformity. The bulbs should be carefully stored and planted early in the spring in only moderately fertile soil. Set the bulbs in rows from 16 to 30 inches apart, about 6 inches apart in the rows, and from 4 to 5 inches deep. The slender seed stalks should be carefully supported by stakes or posts placed at the end of the rows and at intervals along the rows, stretching cord on either side of the rows to hold the seed stalks upright.

The seed heads turn yellow when ripe and should be carefully cut with about 8 inches of stalk before any of the seed is lost. Several cuttings will be necessary. The tops should be laid on a clean sheet in an airy room until sufficiently dry to come out when flailed. A fanning mill or similar means is used to remove the chaff. The seed is then cleaned by washing to remove the poor seed. A small quantity is placed in a vessel of water, the heavy, good seeds sinking, while the light seed and chaff float and are poured off. The good seed is then thoroughly dried in a cool room, well ventilated and when completely dried is bagged and kept in a dry room.

Cultivation.—Thorough cultivation is necessary to obtain a good crop of onions. It must also be constant. The bed must be kept free from weeds and the top soil kept loose by frequent stirring. The roots of the onion lie close to the surface, so only shallow cultivation should be given.

After rains, if a crust is formed on the surface soil, before the seedlings appear, the crust should be broken by carefully raking. In heavy soils where it is difficult to operate hand cultivators, horse implements are used and this requires wide spacing of the rows. This reduces the number of plants to the acre and the yield in like proportion. In good soil, well prepared, the rows need not be more than 12 inches apart. Wheel hoes operated by hand do the cultivating, both single and double wheel according to the preference of the grower. The horizontal blades, where they can be used, are more satisfactory than cultivator teeth. In cultivating do not work the soil over the plants in the rows.

Hand weeding and thinning are required and for this purpose small hand weeders are used. Eight to ten plants are allowed to each foot of row. In good soils where large bulbs are to be grown, the plants are spaced two to three inches apart in the rows.

Weeding and thinning can be avoided in a measure by having the soil properly prepared and setting the seed drills so as not to drop the seed too closely, but sufficiently close to insure a good stand of plants.

The ordinary garden hoe is used in cultivating onions, also scuffle hoes and other implements. The weeds between plants in the rows are removed by hand. Boys and girls are sometimes employed in this work, working with their hands while squatting on their knees.

Onion weeders are made which are used by some growers to weed between the plants in the rows. Reports on them differ. They seem to be satisfactory on light soils, while the plants are small and after they have straightened up. Used before the plants have straightened, many plants are likely to be pulled out. The weeders should be used when the weeds are small and before a crust forms on the surface of the ground. Hand weeding should follow the onion weeder to make the work thorough.

Irrigation.—In the West and South, in some sections, onions cannot be grown without irrigation. The land is flodded before planting and every week or so thereafter until the bulbs have reached full size. Water is then withheld and the bulbs ripened. The overhead system of irrigation is employed in many places. Sprinkling prevents light soils from blowing. It has been found that irrigation increases the yield and is always an insurance against drought.

Harvesting.—Bunching or green onions are harvested, as soon as they are of proper size. The largest plants are used, leaving the smaller ones to develop, which are harvested as soon as sufficiently large. The plants are carefully pulled by hand, the roots cut off and the outside skin removed, leaving an attractive, clean white stem. The onions are then tied in neat bunches, the number in each bunch depending on the custom in the market where they are sold.

Sometimes a change in the bunching can be made to advantage, but any change should be carefully tested before operating on a very extensive scale. For example, suppose the local market is handling bunches of 10 onions, for 10 cents a bunch. It may be that bunches of 4 offered at three bunches for 10 cents will sell much better than the single bunches of ten. Sometimes changes of this kind will create activity in a dull market and at other times it may be almost impossible to sell other than the customary pack.

Northern grown bulbs to be stored should be allowed to ripen before pulling. Immature onions do not keep well. The tops should ripen and the outer skin of the bulb dry before the crop is harvested. In large plantations it may be necessary to begin harvesting as soon as most of the tops have turned yellow to permit finishing the work in good season.

The onions are pulled by hand or thrown out with a plow, the former being the commoner method. From six to ten rows are laid together in long windrows in such a manner that the tops partially cover the bulbs to protect them from the sun.

Here they are allowed to remain for a few days, when they are stirred with a scoop fork or wooden rake, taking care not to bruise or injure the bulbs. After a rain the bulbs must be turned so they will dry.

When the tops have completely withered and the bulbs are dry, they are topped, by twisting off the tops by hand or cutting them with sheep shears, leaving from ½ to 1 inch of top on the bulb. Topping machines are used where onions are grown on a large scale. The machine removes the top, grades the onions and delivers them into bags or crates.

White onions are easily injured by exposure to sun or rain so these must be cured under cover.

Bermuda onions are harvested as early as possible, usually before the ripening of the tops, to take advantage of the better prices prevailing in an early market. These onions are not kept for any length of time, so thorough ripening is not important.

Curing.—When onions are to be stored and sold or used during the winter, they are cured before storing. The bulbs are placed in ventilated crates as soon as the tops have been removed. The crates are stacked in the field and covered to protect them from sun and rain, or stacked under the roof of a shed made for the purpose. If small, light onion sacks are used instead of crates, they are laid on boards to keep them off the ground.

Four or five weeks may be required for thorough curing, depending on the weather. Where a curing shed is used the onions are allowed to remain there until freezing weather.

Grading—Cleaning.—After curing, the onions are run over a sorting rack where decayed, injured and ill-shaped bulbs are picked out and the small onions and dirt drop through the slats. The outer scales are rubbed off, and the bulbs are polished up to make a uniform and clean appearance.

The sorting rack can be so constructed that it will be a grader, grading the bulbs into several sizes, the smaller ones dropping through the first slats, the next larger through the following slats, the largest onions running out of the extreme end.

U. S. No. 1 Grade consists of sound onions, similar in character, free from doubles, scullions and sprouted onions, free from dirt, tops and foreign matter; and free from damaged onions caused by disease, insects or other means. The diameter shall not be less than 1¼ inches.

U. S. No. 1 Grade, Medium.—Lots which meet the requirements of this grade and contain more than 25 per cent. by weight of onions with diameters from 1¼ to 1¾ inches, inclusive, the grade shall be U. S. Grade No. 1 Medium.

U. S. No. 1 Grade, Large.—Lots which meet the requirements of U. S. No. 1 Medium containing more than 90 per cent. by weight of onions with a diameter greater than 2¼ inches the grade shall be U. S. Grade No. 1 Large.

U. S. Grade Boilers shall consist of sound onions of similar varietal characteristics conforming to conditions specified under No. 1 Grade. The diameter shall not be less than ¾ of an inch or more than 1⅜ inches.

Five per cent. by weight of any lot may vary from prescribed size and, in addition, 5 per cent. by weight may be below the remaining requirements of the grade.

U. S. Grade No. 2 shall consist of onions which do not meet the requirements of the foregoing grades.

'Double" means an onion which, by splitting in two parts has broken the outer skin.

"Scallion" means an onion which has a thick neck, and a small, poorly developed bulb.

Packing.—Onions are marketed in a variety of packages, bags, crates, barrels and various baskets. Coarse mesh bags are largely used, holding about 100 pounds. Bags do not protect the onions from bruising, which is their chief objection.

Onions which have been stored for any considerable time, should be repacked before shipping, to remove any that have sprouted, decayed or been injured.

Storing.—Onions must be thoroughly ripened and well cured. Thick necked, or soft and immature onions should be sold when harvested as they will not keep.

To store onions successfully, they must be handled in small quantities, in trays or crates. Plenty of ventilation, dryness and safety from actual freezing are required and any form of building which will supply these needs will answer.

The storage house should be of double construction, with an air space, protected well with paper or other suitable lining, in wood construction. Hollow tile, cement blocks, concrete and brick may be used. The building should be so constructed that it can be made as nearly air-tight as possible, when that condition is desired. The walls and roof should be insulated with air spaces, to maintain a dry, low temperature to keep the bulbs dry, free from rot and sufficiently cold to keep them dormant.

In a cold storage warehouse, onions may be kept at 32 degrees F. as they will not freeze at this temperature and possibly not at a degree or two lower. This keeps the refrigerating pipes from thawing and making the atmosphere damp.

In building construction on farms, both top and bottom ventilation must be provided, so it can be controlled. Bottom ventilation may be obtained by means of drain pipes built into the foundation at the surface of the earth, carried in toward the center of the house, to discharge the cool air where most needed. The openings of the pipes to be covered with wire netting to keep animals out.

The temperature should be kept as low as possible without freezing. During extreme cold, after the house has become sufficiently chilled, the ventilation should be closed to prevent freezing and to retain the necessary cold, preventing the entrance of moisture during warm or rainy periods. Even fog will cover the onions with moisture, if following cold weather. Heat from a stove may be required during very cold weather. In houses of this kind the temperature should not fall below 33 degrees. From 34 to 36 degrees gives best results.

Onion storage houses on farms should be built entirely above ground.

In two story houses, the floor above should be constructed of narrow planks with half-inch spaces between the planks for air passage.

Where crates are used, an inch or more of space is left between the tiers. Bins are sometimes used. A common form is 8 feet wide and 12 to 15 feet deep. Drawer-like shelves slide into position, supported by cleats or runners at each side, with an air space of about two inches between the shelves. On these the onions are placed five or six inches deep.

Where crates are used, the crates are made of $\frac{3}{8}$-inch slats about two inches wide, the crates being sixteen inches wide, fourteen inches deep and eighteen to twenty inches long. The slats are nailed to triangular pieces of oak or other hard wood at the corners, inside the crate. Two by three inch strips are placed between the crates in stacking, for ventilation.

Shrinkage in storage will run from 10 to 20 per cent. In wet seasons there may be some loss from slippery skin and rot.

Yields.—Five hundred bushels of onions from seed per acre is a good yield, while the crop varies from three hundred to a thousand bushels.

In growing Prizetaker from transplanted plants in small areas, a thousand bushels to the acre is not unusual.

Bermuda onions in the South average 10,000 to 12,000 pounds per acre.

Insects.—The onion maggot is the larva of a fly resembling the house fly, but smaller. It lays its eggs on the plants near the base or cracks in the soil. It is the small maggots, about a third of an inch in length that kill the young plants and burrow into the bulbs. The maggots enter the bulbs eating from the inside, so they cannot be reached with a poison spray. A poisoned bait is used to kill the flies before the eggs are laid. The bait is made of sodium arsenate in the proportion of $^1/_5$ ounce; molasses 1 pint; water 1 gallon and some chopped onion. The sodium arsenate is dissolved in boiling water and the molasses added. When cool mix with the chopped onion. This poison is placed about the field in cans as soon as the seed is sown. The cans are refilled when dried out and after rains.

When the plants are up, the same mixture, without the chopped onion may be sprayed on the plants.

Onion thrips are particularly destructive in the South on Bermuda onions. They are very small sucking insects. Large numbers cause the plants to turn brown and die. They are most destructive in dry weather. The remedy is spraying before the leaves are troubled, using tobacco extract or kerosene emulsion.

Diseases.—Onion smut may become serious where rotation is not practiced. It is one of the most serious diseases of the onion in the North.

The remedy is applying a solution in the furrow when the seed is planted, made of one pint of formaldehyde to sixteen gallons of water. Two hundred gallons of the solution is used to the acre, applied by means of a tank attachment on the seeder. A tube carries the liquid in front of the covering attachment, so the seed is wet before it is covered. The treatment is effective and not expensive.

Mildew.—This is a fungus appearing on the leaves, the plants turning yellow and dying. The disease spreads under favorable conditions. Spraying with Bordeaux is recommended by some, but precaution is the best remedy burning the dead tops to prevent wintering the fungus—and, rotation of crops.

ONIONS—THREE VARIETIES

Varieties.—Two types of onions are grown for the bulbs, the American and Foreign.

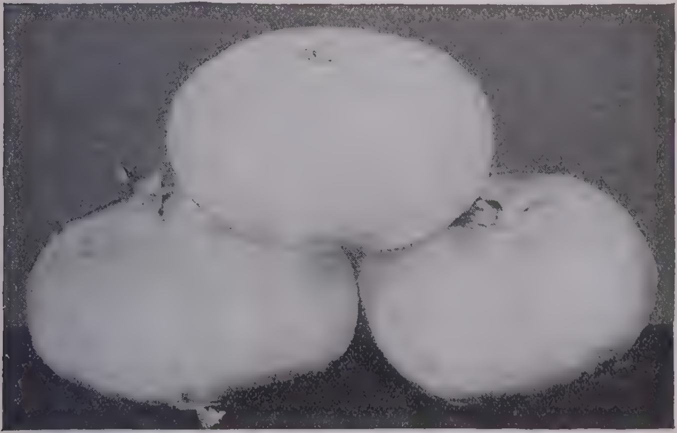
The American onions are smaller, of stronger flavor and keep better than the foreign types and are of three colors, yellow, white and red. More yellow are grown than of the white and red varieties combined. The round or globe onions are in greatest demand.

The popular yellow varieties are Yellow Globe Danvers and Southport Yellow Globe. Ebenezer or Japanese is one of the newer yellow onions. It is mild and keeps well. Of the white, Southport White Globe, Silverskin and White Queen are popular. Of the red, Red Wethersfield, Southport Red Globe and Australian Brown are popular, the last especially in the West. It is mild, sweet and a good keeper.

In selecting varieties there are various factors to consider. First the purpose of the crop, whether for bunching, pickling or mature bulbs. Then there is the time of maturity, whether early or late, also the shape of the bulb and the demand in the market where they are to be sold. The keeping quality and color are important. In most places in the East, the demand is for yellow and white, round or globe onions, although many red onions are sold. In other locations red onions may be in greater demand. The character of the soil on which they are to be grown is important, also climatic conditions.

ONIONS (SOUTHPORT WHITE GLOBE)

Yellow and red varieties are adapted to muck soils. Red and brown varieties do well on prairie soils. All types do well on light soil. Bermuda and Spanish do best on rich alluvial soils. The yield is important, some varieties producing more bushels per acre than others. Finally, the matter of where the bulbs are to be marketed is to be considered, whether near home or at a distance. In the latter case the shipping quality is important.



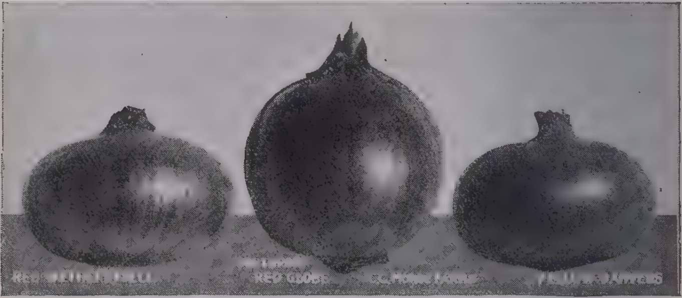
ONIONS (RED BERMUDA)

Foreign Type Onions.—Bermuda, Spanish and Italian onions are larger than the American onions, they are not so hardy and require a long growing season. The flavor is mild and the flesh is tender, but the bulbs do not keep well. The seed should be started under glass.

Of this type Prizetaker is one of the most popular. The bulbs are large, round, yellow and mild in flavor. Single bulbs grown under favorable conditions sometimes weigh two pounds each. These onions can be grown by planting the seeds in the open ground, but the largest specimens are grown by planting the seed in shallow boxes, in February or March in the house, in a hotbed or greenhouse and transplanting to the open ground when the weather is warm.

Ailsa Craig is white or straw-colored, mild and tender. The bulbs are very large when well grown. One of the best keepers of the foreign types.

White Italian Tripoli is a large, white, flat onion. The flavor is mild and sweet. An old favorite.



ONIONS—THREE VARIETIES

Red Bermuda and White Bermuda are large, flat, quick growing onions, but require a longer season than the American types. The White Bermuda is really straw color.

Crystal White Wax is a white flat type, popular in the South and does well North. The flesh is very sweet.

Giant Gibraltar or Denia is somewhat similar to Prizetaker, but is lighter in color and fully as large or larger and milder in flavor. Specimens sometimes weigh 3½ pounds. This variety requires a longer growing season than Prizetaker.

Classed with onions by purchasers in the market are: chives, garlic, leeks and shallots, which will be found under their proper headings.

PARSLEY

Parsley.—The leaves of this plant are used for garnishing, for flavoring and in salads. It is a biennial. The seeds are slow to germinate and on this account it is sometimes started in a hotbed or greenhouse or in a carefully prepared seed bed in the open ground and the young plants set out where they are to mature. Parsley will thrive in any good, moist soil. Leunasalpeter or nitrate of soda are useful in promoting rapid tender growth. The plants being hardy, may be set out as early as cabbage, first being hardened off. The seed may be sown in the open ground at intervals during the season. In

PARSLEY

the South it is grown during winter and spring. In the North, the seed is sown in June for an autumn crop. The leaves are gathered during the season, as they are large enough and tied in small bunches for market. When shipped to distant markets, the bunches are packed in baskets or hampers, with small pieces of ice placed in the packages to prevent heating and decaying.

The rows are spaced about 14 inches apart and the plants 6 to 8 inches apart in the rows. Cover the seed not more than half an inch. One ounce of seed is sufficient for 150 feet of drill.

Parsley can be forced in coldframes, hotbeds or greenhouses during winter. It is grown largely in coldframes around Norfolk, Va., for northern markets.

Clean, shallow cultivation should be given during the growing season.

Champion Moss Curled is a favorite. Dwarf Curled, Summer Green and Fern Leafed are popular.

Turnip-rooted parsley has a fleshy root somewhat resembling a small parsnip. It is used for flavoring soups. This is used in large cities where there is European population. Americans have not yet learned its value. The culture is the same as for carrots.

To insure prompt germination, parsley seed may be soaked for a few hours in warm water just before planting. Or the seed may be sprouted in damp earth, to be sown when the seed swells or bursts. Otherwise a month or more may pass before the seedlings appear.

PARSNIP

Parsnip.—The parsnip was brought to America by the colonists of Virginia very early in the seventeenth century and to Massachusetts a few years later. It escaped from the garden and is now found wild as a troublesome weed.

The roots of wild parsnips are poisonous.

The parsnip is a biennial, producing a seed stalk and seeds from the root developed the previous year.

Parsnips can be grown almost anywhere, where crops are produced. Like all long root crops, it requires a deep, rich soil. Light, deep soils are particularly suitable. On hard, shallow soils the roots will be crooked and branched. Only long, straight roots are desirable for market. The seed germinates slowly and the surface of heavy soil is likely to become baked before the delicate seedlings appear, in which case they will be unable to break through.

The preparation of the soil should be the same as for beets. If manure is used for fertilizing, it should be applied heavily to the preceding crop and none applied, unless it is thoroughly rotted, before planting the seed. In the most favorable soil, fresh manure will cause undesirable divided roots. Well grown parsnips will be a foot long and must have a soil deep enough, and sufficiently well prepared to permit them to make full growth.

Exhibition roots in heavy soil are produced by making deep round holes with a crow bar, filling the holes with light soil, in which the seeds are planted and thinned to a single plant.

The soil must be thoroughly prepared and pulverized deeply and the surface made fine and smooth. Vegetable matter should be worked in very liberally the previous season, and a 4-8-6 fertilizer, that is the percentage of nitrogen, acid phosphate and potash, applied according to the needs of the particular soil on which the crop is planted. A half a ton to the acre or more will most likely be required.

The seed is sown where the crop is to mature, early in the spring. Use only fresh seed, sowing in drills 18 inches apart for hand cultivation and 30 inches for horse cultivation. An ounce of seed will sow 200 feet of row, six pounds being required to the acre, with rows 18 inches apart. Cover the seed a half inch deep.

Parsnip seed germinates slowly, and one object in planting early is so the weak seedlings will have moist soil to push through. If the soil becomes crusted before the plants are up, only a weak stand will be had. Radish seed is sometimes sown with parsnip, so the vigorous radish seedlings will work up through the soil, opening the way for the weaker parsnips. The radishes develop and are removed before they interfere with the parsnips. The radish plants quickly mark the rows so cultivation can begin early. Weeds must be kept down by cultivating and weeding, to give the young plants full opportunity of developing.

When the plants are well established they are thinned to stand 4 to 5 inches apart in the row, or a little farther apart in favorable soil. Hand weeding between the rows will be required.

The roots may be used any time after they have matured. The crop may be left in the ground over winter, but it may be

PARSNIPS (HOLLOW CROWN)

impossible to dig them when the ground is frozen. Part of the crop may be left in the ground for spring use, the balance dug in the late autumn with a garden fork or loosened with a plow, throwing the furrow away from the plants and then gathering the roots by pulling them into the furrow, care being taken not to break the roots.

The tops are removed and the roots washed, packed in hampers, crates or baskets and marketed.

In some markets there is a demand for young parsnips, which are tied in bunches with the tops on, after being washed.

Parsnips are in demand in the winter and early spring, while the ground in the North is frozen, so part of the crop should be dug and stored for this market. The roots may be buried in pits or cellars, covered with moist sand or soil to prevent drying out.

Varieties.—Hollow Crown also called Large Sugar and known by other names is the most popular. There are various strains of this seed offered by different dealers. Guernsey is also known as Student, Improved Half-Long, etc., is also largely grown. New Intermediate does not require soil so deep as other varieties and it is the best for heavy or clay soil.

PEAS

Peas have been cultivated for food for centuries and no longer exist in the original wild state, although half-wild peas sometimes occur in fields. Peas were used for food by the Egyptians and ancient Romans and were brought to America by the first white people to settle here.

Peas are grown in most home gardens; to have them at their best they should be cooked and served as soon as possible after they are picked. Peas are the leading crop of truckers for early and midsummer sales, and for canning rank third, exceeded by tomatoes and sweet corn.

The leading producing states are Wisconsin, New York, California and New Jersey.

Peas are of two classes, smooth and wrinkled. Smooth peas are the hardiest and may be planted earlier than the wrinkled varieties, because they do not rot so easily when the ground is cold, but they are not equal to the wrinkled varieties in flavor.

Soil.—Peas are grown on many different types of soils from sandy loam to clay. Peas do best in a deep, well drained soil supplied with plenty of humus. The humus is needed to hold moisture as well as to feed the plants, but peas will not flourish on wet land or where the drainage is poor. The earliest crops are produced on sandy loams. Clay and silt loams are used for producing late crops.

Thorough preparation of the soil should be given, especially where the vines are to spread over the ground, without cultivation. For early crops the land should be plowed in the autumn so as to be ready for early planting in the spring. It should be well pulverized and deeply, not less than 4 inches and the deeper the better.

When the crop is to be harvested with a mower, the surface is made smooth by rolling, either before or after planting or both, as a mower cannot be used to advantage over a rough surface.

Fertilizers.—Fresh manure should not be used on land for peas. Well rotted manure may be used. The best plan, where manure is to be used, is to use it very heavily on a previous crop. Fresh manure causes rank growth of vine and few pods. Green manure may be used on the preceding crop in place of rotted manure.

While the pea is a legume, early plantings start in growth before nitrification is active and a little quickly available nitrogen, such as leunasalpeter or nitrate of soda is desirable. A complete fertilizer is desirable, one containing about 3 per cent nitrogen, 8 to 10 per cent. phosphoric acid, and 5 to 8 per cent. potash. When grown for the cannery, the vines should be returned to the farm and used for their fertilizing value and for the humus they add to the soil. The pea being a legume increases the nitrogen content of the soil and to that extent is a natural soil enricher.

Planting.—Smooth peas of the Alaska type may be planted as soon as freezes are over in the spring. Wrinkled peas are not as hardy as the smooth, but will stand light frost.

Peas do not do well during hot weather and are grown as winter and spring crops in the South and as spring and early summer crops in the North. Home gardeners plant dwarf varieties in August for an autumn crop, but the results are too uncertain for a commercial crop, except in high altitudes or where the summer temperature is low, with ample rainfall or artificial irrigation.

PEAS—TWO VARIETIES

For a succession, several plantings are made at intervals of ten days or by planting early, medium and late varieties at about the same time. Some gardeners plant Alaska or some other smooth pea as soon as the ground can be worked and possibly a second planting. Later a planting is made of early, medium and late wrinkled varieties—or, several successive plantings of the same variety.

The depth of planting depends on the character of the soil, the season of the year and conditions of moisture. For early plantings an inch may be sufficient, or two inches in light soil. Later plantings may be deeper, so the roots will be cool and moist. On heavy soils two to three inches may be given, while on sandy soils, four inches may not be too much.

Small plantings are made by hand and seed drills used for larger areas. Large plantings for canneries are made with a battery of seed drills or with grain drills, stopping up alternate openings which separate the rows sufficiently to permit cultivation when the vines are small. Peas are also sown broadcast, and the seed harrowed in. In the last two cases the vines are permitted to cover the ground and are harvested with a mowing machine.

When sown in drills, the space between the rows varies from 18 inches to 3 feet apart.

One pound of seed will plant 50 feet of row. When planted in rows 2 feet apart 1½ bushels will be required to the acre and 2½ bushels, if planted in double rows. When planted with a grain drill the quantity varies from 3 to 5 bushels. Use plenty of seed.

Cultivation.—In the home garden, plant in rows and give clean cultivation. Market gardeners usually follow this method although some truckers grow as thickly as for canning. This latter method should be used only on clean land and where the planting is heavy enough so the vines will cover the land and prevent weeds getting a start.

Tall growing varieties are generally supported in small gardens. Double row planting is advisable, with brush stuck up between the rows, or wire poultry netting, fastened to stakes, or lines of twine. Commercial growers usually allow the vines to cover the ground.

Inoculation.—Land that has been cropped regularly with legumes, may not give better yields through inoculation of the seed. Land that is newly planted with a legume will be benefited, if the seed is properly inoculated with the proper inoculant.

Varieties.—There are dwarf, half-dwarf and tall varieties of peas. The lowest growers are about a foot high; the half-dwarf about two feet high and the tall from three to five feet.

The smooth seed peas are the earliest because they are hardiest and can be planted safely earlier than the wrinkled varieties.

Alaska is the most popular smooth-seeded pea which matures its crop all at the same time. It is the variety most largely grown for canneries. The vines are about 30 inches high. First of All is good cropper and good flavor for its type. Early Bird is a new variety of good flavor that seems likely to become popular. Eight Weeks is a first early, 18 inches high. Can be planted before any other variety.

Of the wrinkled varieties, in the extra early class, the most popular are Gradus, 3 feet, large pods filled with large peas of good flavor. Thomas Laxton ripens a few days later. Nott's Excelsior is an improved American Wonder; the plants are about 14 inches high. Little Marvel is considered by many as better than Nott's Excelsior. 18 inches; begins bearing about the time Gradus is at its best.

Of the newer varieties World's Record or Prosperity is an earlier strain of Gradus, about 2 feet high, pods 4 inches long, well filled and of good quality.

Sutton's Excelsior is more productive than Gradus and is ready just after Gradus and Little Marvel.

For main crop and late peas, Alderman, Champion of England, Potlach, Admiral and Everbearing are the leading varieties.

A type somewhat new in America is the edible-podded or sugar peas. The pods are larger than those of other varieties, but at the present time are grown almost exclusively in home gardens. The peas are cooked like string beans, the pods being cut into short sections. The varieties are Melting Sugar, Giant Sugar and Dwarf White Sugar.

Harvesting.—Picking peas by hand is about one-half of the cost of producing the crop. Two or three pickings should be made where the crop is wanted in the best condition. Some growers pull the vines and pick the pods at one time, but quality and quantity is sacrificed at a saving of picking expense.

For canneries, peas are harvested with a mowing machine, cutting the vines close to the ground. Special attachments are made which lift the vines so they are cut close to the roots.

Other attachments may be had to place the vines in windrows. A hay loader is sometimes used in loading the vines on wagons. At the cannery the peas are separated from the vines and shelled with a viner. The shelled peas pass through screens which separate them in sizes. The smallest bring the highest price.

The pods should be well filled with tender peas, when they are large enough to fill the pods well, without being so old as to be of inferior quality.

A yield of a ton to the acre of shelled peas is a good crop. The average yield is from 1,600 to 2,000 pounds.

Market peas are usually sold in the pod.

Packing.—Peas are packed in baskets or hampers for market. When shipped long distances a block of ice should be placed in the center of the package. Plunging the peas in cold water is practiced by some growers, before packing, to retain plumpness.

Peas are shipped in quantity over long distances in refrigerator cars. Otherwise they heat and deteriorate very rapidly.

Diseases.—The most troublesome diseases are stem-blight, root-rot, pod-spot, leaf-spot and mildew. Mildew appears on the leaves and pods. Pod and leaf-spot appear on pods, leaves and seed. Root-rot results in wilting of the plant.

No satisfactory remedy for controlling these diseases has been found. Disease-free seed and crop rotation should be used as a preventative.

Insects.—The pea aphis attacks the terminals of the young vines. Small plantings may be sprayed with nicotine sulphate and fish oil soap, wetting both sides of the foliage. Tobacco dust sprinkled over the plants as soon as they are up is beneficial. This is not practicable on large areas, where very early planting is recommended so the crop can mature before the aphis can become troublesome.

Pea Weevil.—The eggs are deposited on the pods. In the North the weevils remain in the seed peas until spring. Clean up the refuse in the field. Fumigation with carbon bisulfid will destroy the weevils in the seed.

Fumigating is done in a tight bin or barrel such as a kerosene oil barrel, which holds about 5 bushels or 300 pounds of seed, which may be treated with 3 ounces of bisulfid of carbon. The top must be closed tightly and left for 48 hours.

Carbon bisulfid is sold in 25 to 100 pound cans. It may be thrown onto the peas or placed in shallow dishes set on top of the seed. In treating large quantities of seed 5 to 8 pounds is used to every 100 bushels. If the temperature is below 60 degrees F. the dosage must be increased. This gas is exceedingly explosive. Allow no fire or light of any kind around the building or enclosure where it is used, until it has been well aired. Do not inhale the fumes.

Cowpeas are considered a farm crop, but they are grown quite generally by market gardeners for green manure, turning under the crop when well grown.

The cowpea is used in many places as human food in the green shell and dried. It was used in their diet by the ancient Romans and in Asia and Africa. In the South the cowpea is commonly called pea and the culinary pea, English pea.

Cowpeas are good for ensilage, hay and pasturage and are an important soil-improving crop. They can be grown during the summer, after the spring or early summer crop is harvested and before planting the winter vegetables.

Sow the seed after the ground becomes warm, about two weeks after corn planting time. Ninety days are required without frost to mature the seed. In the latitude of New York City a good hay crop can be harvested from seed sown in June. Sown broadcast, from 60 to 120 pounds of seed will be required to the acre. In drills 75 pounds will be required to the acre. For seed, plant in rows 3 feet apart, using 15 to 20 pounds to the acre. Cowpeas are sometimes planted between corn at the last cultivation.

PEPPER

Pepper.—Peppers are native of tropical America. There are several different types. Cayenne or red pepper is made from a small fruited, pungent variety, dried and finely ground. Paprika is made from fruit from which the seeds have been removed, dried and ground. The large sweet varieties of pepper are cut up and used in salads, for flavoring in cooking and also are served baked.

The pepper is increasing in commercial importance. According to the 1920 census, New Jersey led in production, the 1919 crop being valued at $883,654, California was second and Florida third. The production for the entire country amounted to $3,079,285.

Climate.—Pepper is grown in nearly every part of the United States, although it is naturally at home in tropical and subtropical countries. Pepper does not require as high a temperature as egg plant, but it is tender to frost.

PEPPERS (RUBY KING)

PEPPERS (CELESTINE).

Soil—Pepper thrives in a deep, rich, somewhat moist well-drained, warm, sandy loam, but is grown successfully on heavy soils. A southern exposure in a spot sheltered from the wind is most favorable.

PEPPERS (LONG RED CAYENNE)

Culture.—Pepper requires the same treatment as eggplant and tomatoes. Start the plants in hotbeds or greenhouses and set out when the weather is warm. A high temperature is required to germinate the seed and insure active growth. Generally the early crop secures the highest price.

PEPPERS (HARRIS' EARLIEST)

The plants may be set as closely as 18 inches apart for hand cultivation, 30 inches for horse cultivation. Earth may be ridged up around the plants to help support them, when they are heavy with fruit.

Pepper plants require at least three months uninterrupted growth to produce a profitable crop. Seed should be carefully selected. Sweet peppers will develop the pungent or hot character if pollinated with the pungent-fruited varieties. An ounce of seed will produce 1,000 plants.

Fertilizer.—Rotted manure may be used with good results. A little immediately available nitrogen should be given early in the season, but excessive amounts must be avoided. It is customary to use from 500 to 1,000 pounds to the acre of a 4-8-8 fertilizer. The figures representing the percentage of nitrogen, phosphoric acid and potash.

Harvesting.—After reaching maturity peppers will remain on the plants for some time without deteriorating.

They are marketed green and after they have turned red, packed in baskets and hampers.

Varieties.—There are two classes of peppers: sweet peppers and the pungent varieties. Mild fruited varieties include: Giant Crimson, Bull Nose, Neapolitan, Chinese Giant, Sweet Mountain, Ruby King, Sunnybrook and Pimento.

The pungent or hot varieties include Long Red Cayenne, Red Chili and Coral Gem Bouquet, the most desirable for the North, maturing early. The hot peppers are small-fruited, used for seasoning and pickling. They may be dried for winter use by hanging in the sun.

Bird's Eye or Creole is the smallest fruited and the most pungent. Tobasco is the variety used to make tobasco sauce by pressing out the juice of the fruit. The plants are from 3 to 4 feet high, bearing fruits an inch or two in length. It does not usually ripen its fruit as far north as Pennsylvania, when grown in the open ground.

POTATOES

Potatoes.—The potato is grown over a wide area. New York, Minnesota, Wisconsin, Maine, Michigan, Pennsylvania, in the order named, lead in production.

Investigation shows that the tuber formation begins about the time of the end of the flower-bud development.

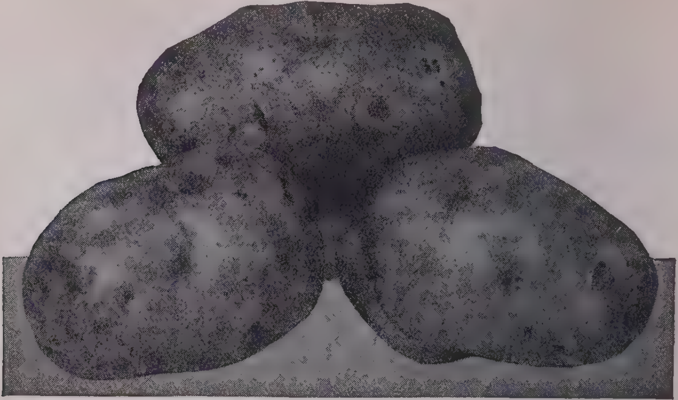
Climate.—Potatoes require about the same climatic conditions as corn, preferring a cool growing season, with a temperature ranging from 60 to 75 degrees.

Potatoes are grown quite generally over the United States where garden crops can be grown.

Soil.—Potatoes are grown on a variety of soils from sandy loam to clay soils. Heavy soils should be lightened by working in vegetable matter liberally and it is also needed in light soils to retain moisture. Best results are obtained on naturally rich soils of medium texture, deep and friable. Very light soils are not sufficiently retentive of moisture, but that may be overcome in a degree by adding vegetable matter. Very heavy, wet soils favor development of blight.

Potatoes are grown in New York in rotation with oats, followed by hay. Other rotations are practiced in different states, to keep down insects and disease. A rich clover sod, heavily manured, plowed and planted to corn or beans, the year before, will give a good yield of potatoes.

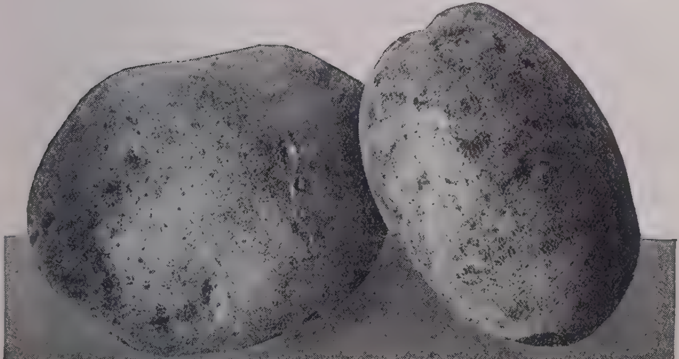
The preparation of the soil is important as the crop very largely depends on this work being carefully performed. The plowing should be as deep as it is safe to go. Where there is a clay hard pan, the depth of the soil can be increased by



POTATOES (IRISH COBBLER)

POTATOES (EARLY OHIO)

POTATOES (GREEN MOUNTAIN)



POTATOES (SIR WALTER RALEIGH)

plowing slightly deeper each year. In heavy soil, disking and harrowing should be very thorough before planting.

Fertilizer.—The potato is a heavy feeder and fertilizing therefore should be liberal. Manure should be applied, if used, very heavily on the preceding crop and if lime is used, that also should be used not immediately before planting potatoes, but on the preceding crop.

Grass or clover sod turned under and thoroughly prepared makes good potato land. Rye turned under is commonly used.

Complete fertilizers of somewhat different formulas are used in different localities and on different soils. On some light soils as much as a ton to the acre is used, while on heavy soils as little as 500 or 400 pounds may be used. Acid phosphate is generally the most needed element, with potash next and only small quantities of nitrogen. Popular formulas are 4 per cent. nitrogen, 8 to 10 per cent. acid phosphate, and 4 per cent. potash. Another popular formula is a 3-8-6.

When the planting is done with a potato planter, the fertilizer is applied with an attachment which drops it at the bottom of the furrow, slightly covered with earth to prevent burning, the seed piece resting on soil over the fertilizer.

Do not use wood ashes on potatoes.

A second application of fertilizer may be given along the rows as soon as the plants are established. Fertilizer distributors are also used.

Seed.—In selecting seed, growers generally prefer certified seed grown in the North. The seed should be plump, free from disease and without sprouts. Even certified seed should be carefully inspected before planting. Reject it if it is not free from disease. Cut and examine the center of the tubers.

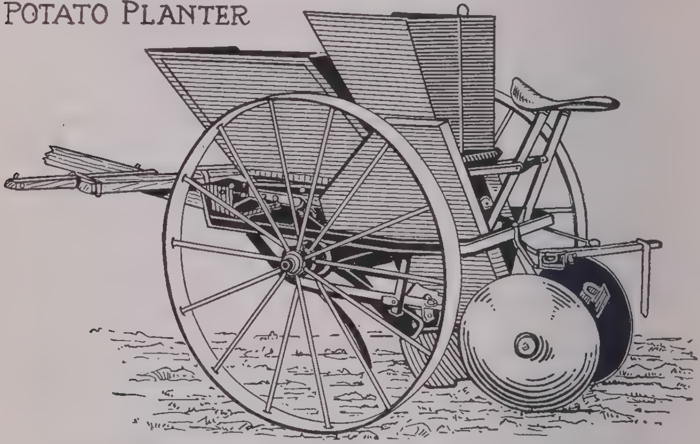
A potato that is kept, after it is dug, in a cool place, moderately light and out of the direct sunlight and in not too dry nor not too moist atmosphere, will turn green and hard and develop short, strong, stubby sprouts. This is called greening and is a common practice in Europe. There the tubers are exposed to moderate light for two or three weeks before planting, so they develop sprouts. Those which develop no sprouts or have weak or diseased sprouts are discarded. The advantages claimed are increased yield and earliness.

In Europe the small tubers are selected from large hills of vigorous, healthy plants and these are used for seed without cutting. The American practice is to use large, disease free potatoes, cutting good sized pieces, with two to three eyes to the piece.

Select seed potatoes with care, as yield reducing diseases are transmitted by the seed. Some diseases do not show on the tubers, but they develop in the vines. Good seed should produce a yield of 200 bushels or more to the acre, while the average yield in New York State is about 150 bushels per acre. Do not use ordinary potatoes for seed. A one barrel sack of 165 pounds, contains 11 pecks. A peck will plant about 100 hills. Ten to twelve bushels are required to the acre.

To improve a strain of potatoes, select tubers from hills having large, well developed, disease free and the most productive plants. Use the largest and most perfect potatoes from the hill and repeat the operation year after year.

Certified seed is seed which is certified to be free from disease and to be true to name and type. There has been just complaint recently regarding some alleged certified seed.



MACHINE USED FOR PLANTING LARGE AREAS

Planting.—Early varieties should be planted as early as the soil can be prepared, when the weather is safe, as with the early crop, it is the earliest market that generally brings the best price.

When planting is done by hand, the seed for early potatoes is dropped 15 inches apart, and for late potatoes 18 inches apart, in rows three feet apart. Machines are used for planting large areas.

Four inches is the planting depth in somewhat heavy soils and slightly more on light soils. Except where the soil is wet and cold, potatoes should not be hilled, but given level cultivation. On heavy, wet soils shallow planting is desirable and ridging done during the season. This gives the plants a drier and warmer soil and is the custom where irrigation is used. Where the soil is light and the rainfall moderate, ridging or hilling is injurious.

Cultivation.—The roots of the potato are close to the surface and where level cultivation is given, will extend across the rows. Early cultivation may be frequent. The spike tooth harrow may be used when the plants are first up, to keep down the weeds and retain moisture. Later, cultivation may be given between the rows, and as the plants develop this should be quite shallow. As soon as the plants are large enough to shade the rows the weeds will be kept down and only very light and infrequent cultivation will be required, if any.

Harvesting.—Except in localities where freezing is likely before the tubers have fully matured, the crop should not be dug until the vines have matured, unless market prices are sufficiently high to warrant digging earlier.

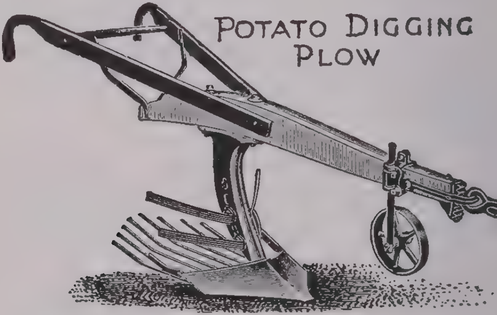
After digging, the tubers are left exposed for a couple of hours to dry. Small fields are dug by hand, slightly larger, with a plow and large fields with elevator diggers. The potatoes are picked up by hand, placed in crates or baskets and hauled to storage or bagged and taken to market.

Marketing.—Potatoes that have been graded and are uniform in size, that are all of good size, should be offered as such for which a better price should be received than ungraded potatoes as dug from the field.

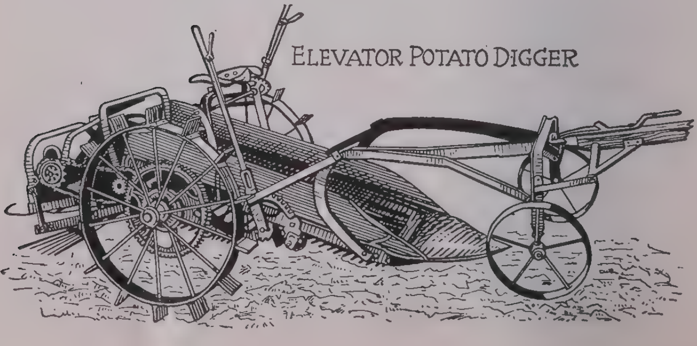
In some localities the marketing of potatoes is done through co-operative organizations. The crop is sold largely to dealers who store and ship to commission merchants, then to wholesalers and finally to retailers.

Some growers are fortunate enough to have a few customers who take the entire crop, a hotel, restaurant or a dealer or two. Others handle the crop at a roadside market.

Early potatoes from the South are shipped in barrels, although bags are being used increasingly. In the North and West, burlap bags are used. In the East bags containing 165 pounds and in the West 100 to 120 pounds are used.



FOR DIGGING VERY LARGE FIELDS



Storing.—Potatoes should not be stored in piles deeper than three feet at temperatures of 50 degrees F. and five feet or less, when a temperature of 45 degrees is to be maintained for some time. Stored potatoes always show some shrinkage in bulk and weight.

Varieties.—Including the foreign varieties, there are literally thousands of varieties of potatoes. Irish Cobbler is a popular early variety. Early Ohio is an early, with small vines. Bliss' Triumph is very early; it is the Bermuda potato sold in our early spring markets. Golden Rural or Rural Russet is a very heavy yielder in some places. Green Mountain is one of the finest, mealy, white potatoes. It does best on light soil, in the North. Bovee is earlier and more productive than Early Rose. State of Maine, medium early, round potato productive and good keeper. Sir Walter Raleigh, a heavy cropper. Rural New Yorker No. 2, a late, disease resistant variety, yields well. Early Ohio, red.

In the West, Early Six Weeks and Ohio Junior, Pearl or Peerless and Blue Victor and Early Peachblow are the favorite varieties.

Soil, temperature and market demand should be considered in selecting varieties. Rural and Peachblow are more disease-resistant than others.

Diseases.—Diseases of the potato are influenced to a considerable extent by weather conditions. A disease may be very troublesome one year and not much the next. Some diseases must be fought continuously. Potato growers, to be successful, must fight diseases and insects promptly, vigorously and persistently.

Late Blight is most serious in wet seasons. The affected areas on the leaves are water-soaked in appearance. The infection is through the tuber and spreads rapidly from plant to plant.

Spraying every ten days with Bordeaux mixture under high pressure is the remedy. Protection lies in keeping the plants well covered. Spores washing down into the soil from diseased plants cause rotting of the tubers, late in the growing season. Hilling or ridging up the potatoes may afford some protection. Late blight is often mistaken for tip-burn.

Wilt causes wilting of the plants late in the growing season. The base of the plant is first affected. Watch the seed in cutting and discard any tubers showing discoloration at the stem end.

Scab is favored by alkaline soil. Do not use lime, wood ashes or manure on soil where potatoes are to be planted. Use these, if at all, on crops planted the year preceding potatoes.

Rhizoctoniose looks like dirt on the skin of the potato. Soak the seed before cutting, for two hours in corrosive sublimate, 4 ounces to 30 gallons of water. This is deadly poison; use it with caution.

Black-leg causes decay at the base of the stem and on the stem-end of the tuber. Prevalent in the North-east. It first appears in yellowing of the leaves, resulting in the death of the plant. Use disease-free seed and treat as for scab.

Leaf-roll will be noticed in the upward rolling of the lower leaves, which will become thick. Control consists in disease-free seed and control of insects on the plants.

Mosaic.—Light green blotches appear on the foliage and the leaves become crinkled. The disease is carried in the seed although it may not be visible. The disease seems to be carried and spread by aphis. The control is the same as for leaf-roll.

Insects.—The potato bug or Colorado beetle, aphis, flea-beetle and leaf-hopper are the most troublesome insects of the potato.

Colorado Potato-beetle or Potato Bug is troublesome throughout the country and too well known to need description. The greatest damage is done by the larvae. They hatch from orange colored eggs which are deposited on the under side of the leaves. Left to themselves they strip the plants of foliage and thus ruin the crop. The adult beetles winter over in the soil. The control is by means of arsenical sprays, arsenate of lead, arsenate of soda and Paris green. Paris green and arsenate of soda must be properly diluted with water or Bordeaux mixture or neutralized with lime or it will burn the foliage and seriously injure the plants. Arsenate of lead does not burn and sticks better than the others. This is recommended in mixture with Bordeaux as the plants seem to benefit from the copper sulphate and thus the spray accomplishes two purposes, keeping down the bugs and blight. Nicotine sulphate may also be added to destroy the aphis, thus making a three purpose spray. Spraying for the potato bug should be done immediately after the larvae hatch and as often as required during the season. Paris green is used at the rate of one pound to 50 gallons of water. Arsenate of lead 4 pounds to 50 gallons of water.

Aphis.—The potato aphis is a pink or green plant louse, sucking the juices from the tender stems and under sides of the foliage. Unchecked, the aphis may do serious damage. Spraying with nicotine sulphate, which must cover both the upper and under sides of the leaves, is the remedy. This may be applied with arsenate of lead and Bordeaux. Eliminate wild rose plants from the field and along the fences.

Flea-beetle is a small black, hard-shelled beetle which eats holes through the leaves. The leaves will be skeletonized unless the beetles are checked. The larvae sometimes bore into the tubers. The adult beetles winter over in trash. Cleaning up the fields after harvest and spraying with Bordeaux is the remedy. The spray only acts as a repellant.

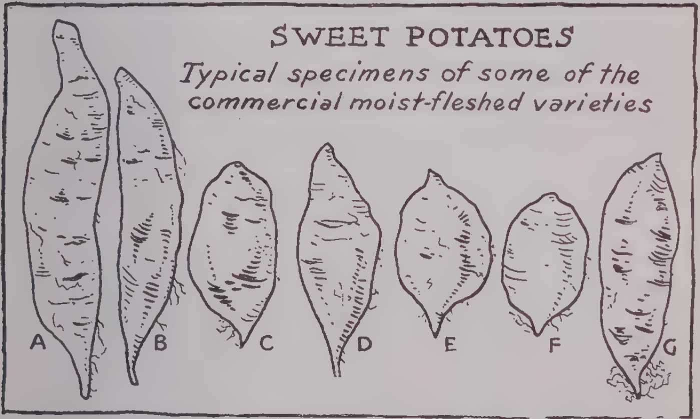
Leaf-hopper is a troublesome green insect, about an eighth of an inch long. It moves about quickly, from plant to plant, sucking the juices from the leaves, the tips becoming brown and dead. It winters in both adult and egg form, appearing early in the season. Covering the plants with Bordeaux, both under and upper surface of the leaves, as a repellant, is the only known remedy. Some growers use nicotine sulphate with the Bordeaux.

Wire-worms are larvae of click-beetles and eat into the tubers. Autumn plowing will result in many being killed by freezing. Rotation is also recommended.

White Grub is the larva of the May-bug or June-bug. The larvae are fat, white grubs. They sometimes cause damage by eating into the surface of the tubers or damage the roots or stems. White grubs are most common in fields which have been in sod. The control is the same as for wire worms. When plowing, let chickens or turkeys roam over the freshly plowed land. They will scratch out and devour many grubs.

SWEET POTATO

Sweet Potato.—The sweet potato is an important crop in the South, also in New Jersey, Delaware, Maryland, Missouri, Illinois and California, and somewhat in Pennsylvania, Southern Indiana and Ohio. The sweet potato does not belong to the family of *solanums*, as does the white or "Irish" potato, but to the *convolvulus* or morning-glory family.


SWEET POTATOES
Typical specimens of some of the commercial moist-fleshed varieties
A
B
C
D
E
F
G

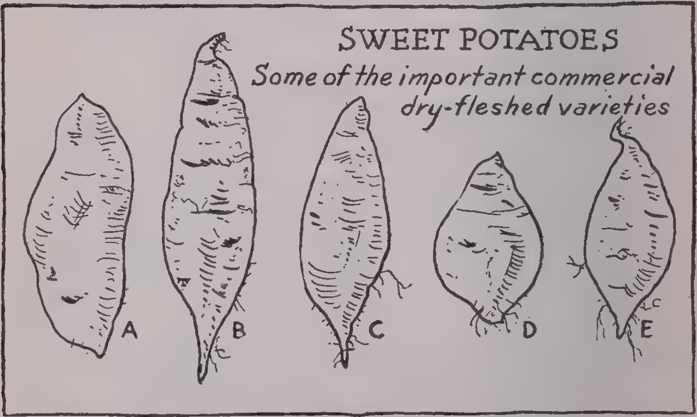
A—Yellow Belmont. B—Pumpkin. C—Porto Rico. D—Nancy Hall. E—Southern Queen. F—Dooley. G—Bunch

Climate.—The sweet potato requires a long, warm growing season, at least four months. It is drought-resistant and thrives in sections so dry that other crops cannot be produced. The plants may, however, require water when they are set and somewhat thereafter.

Soil.—Well drained, sandy loams give best results, but crops are produced on various soils. Rich soils encourage too much vine. Good drainage is essential.

In the South, much of the sweet potato land is plowed only 3 or 4 inches deep. Twice this depth is better. Much of the planting is on low, flat ridges, made by throwing two shallow furrows together. This assures good drainage.

Fertilizer.—Commercial fertilizers are used for sweet potatoes, ranging in nitrogen, phosphoric acid and potash from a 2-8-6 to a 3-8-8, using from a ton to a ton and a half to the acre, applied broadcast. Where about 500 pounds only is used to the acre, the fertilizer is applied in the row.


SWEET POTATOES
Some of the important commercial dry-fleshed varieties
A
B
C
D
E

A—Big stem Jersey. B—Triumph. C and D—Yellow Jersey. E—Red Jersey.—From Bul. of U. S. Dept. of Agriculture

Propagation is by means of what are called slips, sets or draws. The tubers are bedded in fine soil with proper moisture and heat. The potatoes sprout and produce rooted plants which are removed for field planting. In the South cuttings are sometimes made from the vines in the field, for additional planting. Vine cuttings are thought to produce more uniform tubers, but this method is only suitable for the South, where the seasons are long.

Hotbeds are used in the North for propagating. The amount of manure used depending on the locality and the heat required. Usually a foot of manure is sufficient. Hotbeds heated with flues and with hotwater are sometimes used. Hotbeds are also used in the South for very early plants.

At the time of planting, the bed should be kept from 75 to 80 degrees F. and gradually dropped to 70 degrees, before the plants are set in the field. Ventilation must be given according to weather conditions and water supplied as needed. Six weeks is required to produce plants large enough to set out.

The seed potatoes are set closely, but without touching and covered with sand or soil and immediately watered.

In the South the plants are started in beds carefully made in the open. If manure is used for heat the beds are made a foot deep, about 5 feet wide and as long as required. If manure is not used, the beds are made only about 6 inches deep. Three or four inches of soil is thrown over the manure or on the bottom of the bed, where manure is not used and the potatoes placed on this, covered with an inch or two of soil. The bed is then watered. When the plants are up, a little more covering is added. Straw or hay is placed over the bed to retain the moisture and as a protection from cold. This is removed as soon as the plants come through.

Six to eight bushels of seed are required to set an acre where one pulling of plants is made. Half the quantity will be sufficient if two or three pullings are made. A bushel of large tubers will produce fewer plants per bushel, than smaller tubers. A bushel of good tubers should give 2,500 plants from three pullings.

Treat the seed for ten minutes in a solution made of one ounce of corrosive sublimate in eight gallons of water. Rinse and dry the seed in the sun. Use this poison solution only twice in treating the seed and then make a fresh solution.

Planting in the field should not begin until the ground is warm and there is no danger from frost. Set the plants just before or immediately after a rain, otherwise watering will be necessary. Puddling is sometimes done instead of watering. This consists of dipping the roots of the plants in thin mud, made of soil and water, to prevent the roots drying out. Do not allow the roots to dry from the time they are pulled until they are planted.

Spacing of the plants is determined by the character of the soil and the variety planted. Long vines need more space than short. The spacing in the rows varies from 18 inches to 30 inches, and the rows placed about 3 feet apart. From 8,000 to 12,000 plants are used to the acre. The plants are set by hand or with a transplanting machine. The soil should be packed firmly about the plants.

The plants from the seed should not be pulled until well rooted. In pulling, hold the potato in place with one hand and pull the plant asunder, with the other.

Cultivation starts soon after planting, keeping down weeds and preventing a surface crust from forming. Spike tooth cultivators are used until the vines are too large to permit. When the vines are too long for cultivating, the large weeds are pulled by hand. Disturbing the vines reduces the crop.

Varieties.—Big Stem Jersey, Yellow Jersey and Jersey Red are the popular varieties of the Jersey group.

Nancy Hall, Porto Rico, Southern Queen, Georgia and Pumpkin are the important varieties of the Yam group.

In selecting varieties the demand in the market where the tubers are to be sold should be considered, also climate and soil. Some markets prefer white and some red sweet potatoes.

Big Stem Jersey has long vines. The potatoes are yellow, spindle shaped and late. The flesh is light yellow and dry when baked. A heavy yielder. A good variety for the North.

Yellow Jersey has smaller tubers than Big Stem Jersey. There are two types, long spindle potatoes and a short round type.

Red Jersey has red skin, otherwise is similar to Yellow Jersey.

Nancy Hall is the most important variety of the South. It is early. Tubers yellow, oblong, of medium size. Sweet and moist when baked. Keeps well.

Southern Queen keeps well and is therefore grown for late markets. The potatoes are white, thick, spindle shaped. Yields well. When baked, the flesh is sweet and moist. It is known under many different names.

Triumph is grown in the South for early shipments to the North. The tubers are long and spindle shaped. Color, light yellow. Medium moist when baked.

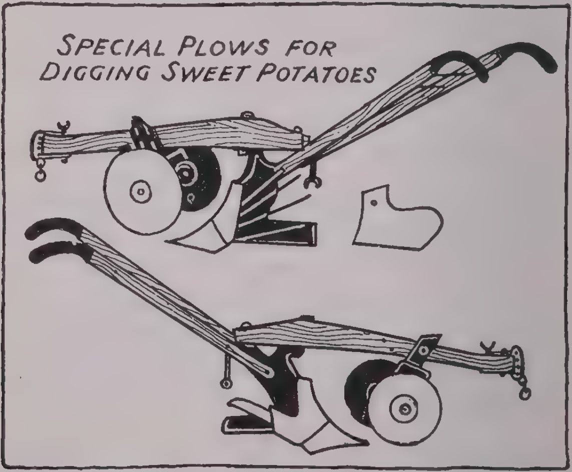
Georgia is largely grown for home use. It is known under many names. It is a late variety. Not a heavy yielder, but of good quality.

Pumpkin is a late, salmon colored, spindle shaped variety. Yields well. The flesh is very sweet and moist.

Porto Rico is second to Nancy Hall in production. The potatoes are red, sweet and moist.

Dooley is dark yellow to salmon. Short tubers with large circumference.

Harvesting.—For early market the crop is harvested as soon as it is of sufficient size. The main crop is not dug until it matures unless there is a hard frost, when the crop must be dug.



AFTER PLOWING THE TUBERS ARE DRAWN BY HAND

Decay sets in as soon as frost kills the vines, the decay passing down the vines to the tubers. The crop is dug with a plow known as a middle buster, the tubers drawn out by hand and left exposed for a short time to dry but never over night. The grading is done as they are gathered in the field, the potatoes carefully placed in containers and taken to the storage house.

Tubers for next year's crop are selected when the crop is harvested. The tubers are selected from productive hills of tubers of uniform shape and size.

Marketing—Hampers and baskets are used for local markets and barrels for distant markets. In winter the barrels are lined with paper. Winter shipments must be protected from frost.

Curing and Storing.—Sweet potatoes are cured by keeping them in a temperature of 80 to 90 degrees F. with good ventilation for two to three weeks. When cured the temperature is lowered to about 55 degrees and kept there.

For small quantities the tubers may be stored in a warm attic or near a cellar furnace. Special houses are built for commercial storage.

Insects.—Few insects trouble sweet potatoes. The sweet potato weevil causes the greatest damage, chiefly in the South. The beetles feed on the vines and roots and the larvae eat into the tuber.

Keep down all weeds and clean up fields and burn all trash. Spray plants with arsenicals for first appearing weevils. Dip slips into arsenate of lead before planting.

Diseases.—Several diseases cause trouble to the plants in the field and to the tubers in storage. The United States Department of Agriculture after careful study in field and storage offers the following recommendations:—

Stem Rot.—The leaves become dull and yellowed, the vines wilting. The stems are blackened inside and the discoloration may extend several feet from the hill. The disease may extend to the root. Slips from diseased potatoes are likely to be diseased.

The fungus lives over winter in potatoes in storage, growing from diseased seed into plants developed from them. Only healthy seed should be used and these should be selected at digging time while the tubers are attached to the vines. Test each hill from which potatoes are selected, by splitting the stem and potato, taking seed only from plants whose stems are not streaked with black. Store the seed where it will not come in contact with other stock.

The seed should be disinfected with corrosive sublimate before planting, using only disease-free soil in the plant bed. Crop rotation and planting only vine cuttings; planting on land that has not been planted to sweet potatoes for six years, are the precautions.

Black-rot attacks underground portions of the plants. Dark, circular, sunken spots appear on the tubers and gradually enlarge. Small black spots may appear on the stem and enlarge, rotting off the stem. This disease causes serious storage losses.

The control measures are the same as for stem-rot. Examine seed carefully before putting in the seed bed.

Foot-rot appears as small brown to black spots on the stem, near the ground. At first the growth is slow, but it eventually girdles the plant. Round, black specks, appear in the diseased area and the plant wilts. The trouble may extend to the roots, causing a brown, but firm rot on the tuber.

Careful seed selection, disease-free seed beds and crop rotation are the control methods. The disease is carried from the field to the storage house. Slips from diseased potatoes spread it in the field.

Scurf, also called Jersey Mark and Soil Stain. This disease appears as a brown discoloration on the surface of underground parts of the plant. The fungus does not break the skin and is easily scraped off. It is most troublesome on soils containing a large quantity of organic matter, on low land and in wet seasons.

Treat the seed with corrosive sublimate and use fresh soil in the seed bed.

Root-rot.—This disease appears on underground parts and spreads in both directions. It may enter the tuber or cause spots on the surface, resulting in a brown rot which destroys the potato. The organism lives over winter in the soil on dead vegetable matter, or in the far South on winter crops. As it is killed by freezing, it is only troublesome in the South.

This disease is difficult to control because it grows on alfalfa, cotton and other plants. Deep, clean cultivation, crop rotation and the use of disease-free seed is recommended.

Leaf-blight appears on the upper side of the leaves in round or angular spots, an eighth to a half inch in diameter, separated from the healthy tissue by a dark line. Inside the line is a strip of brownish tissue, and inside this ring is a circular area, lighter in color, in which will be found black bodies containing spores.

Leaf blight is not common in Delaware, New Jersey, Maryland, Kansas, Iowa and Illinois. It is not often serious enough to require remedial attention.

Leaf-spot fungus produces spots on the leaves similar to leaf-blight. The spots are white, surrounded by a brown border. Within these white areas, one or more black specks may be found. The specks contain spores which are carried by insects to other leaves. This trouble is not sufficiently serious to require the application of a remedy.

Storage Rots.—**Soft rot** is one of the most destructive storage diseases. The decay begins at one end and spreads rapidly. With a high temperature and humidity, the entire tuber will be destroyed in a few days. The potatoes first become soft, watery and stringy, but later become hard and brittle. One affected tuber may communicate the disease to all those in contact with it. The surface spores may be carried by flies or communicated by handling.

Ring-rot differs from soft-rot in the decay beginning between the two ends of the tuber, forming a ring around the potato.

Dry-rot begins usually at the end of the potato, producing a firm brown rot. It grows slowly, the tuber becoming dry and hard. Small protuberances finally cover the entire surface. Scraping the skin will reveal a black appearance.

Java Black-rot is similar in appearance to dry-rot. The disease begins at the end and grows slowly, destroying the tuber in from 4 to 8 weeks.

Charcoal-rot.—Minute spherical coal black bodies throughout the tuber.

Control of Storage Rots.—One of the important control measures is the elimination of field diseases. Very careful handling to prevent any breaking of the skin or bruising of the surface of the potatoes will also be of material help in controlling storage rots. Many of the diseases gain entrance through injured tissue. Thorough curing and maintaining good storage conditions will aid greatly in controlling storage rots.

PUMPKIN

Pumpkin.—The requirements of the pumpkin are practically the same as for squash. Pumpkins are frequently grown as a companion crop with corn. When grown in this way they require no cultivation other than that given the corn. Three or more seeds are sown to a hill, thinning to one plant. Pumpkins want plenty of room to ramble.

PUMPKIN

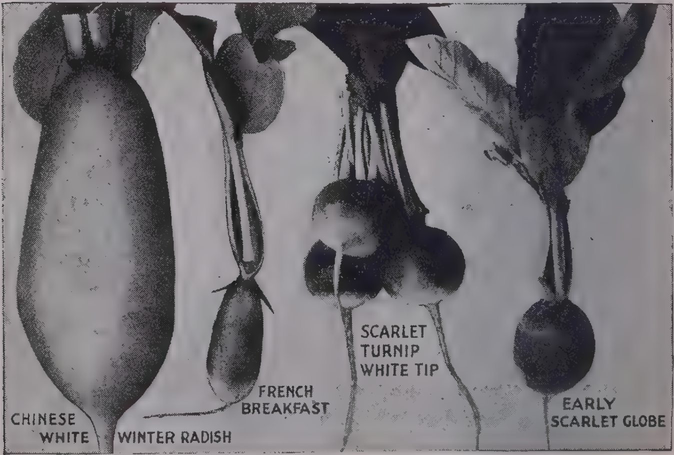
Pumpkins should be cut with a portion of the stem left on the fruit. When the stem is removed there is danger of decay. Gather and store pumkins before they are touched with frost.

Varieties.—Small Sugar, also called Sugar Pie, New England Pie, etc. This is the best variety for pies. The fruits are small, with deep orange skin, rich orange flesh of good quality and sweet. A good keeping variety.

Mammoth, Mammoth Prize, King of Mammoths, Jumbo, etc. Fruits of enormous size. Salmon orange skin; yellow flesh. A favorite for exhibition purposes. To grow exhibition specimens, allow only one or two fruits to develop on a vine. Only grow one plant to a hill.

White Cushaw or Jonathan. A popular variety South. Has a crooked neck. Creamy white shell. The fruit is about 2 feet long. The thick neck is filled solid with meat. Stores well.

Large Field or Big Tom is largely grown for feed.



RADISHES—FOUR VARIETIES

RADISH

Radish.—The radish is another ancient vegetable. Radishes were served on the tables of the Pharaohs, and are now grown by every home gardener. They are ready in from 3 to 6 weeks after the seed is planted. Large quantities are grown by market gardeners in greenhouses, hotbeds, coldframes and in the open ground.

The radish is a cool weather plant, but is grown under a wide range of climatic conditions. Ample moisture in the soil, held by a liberal quantity of humus, will overcome high temperatures to a considerable extent.

Soil—The radish is grown on all types of soil. The best results will be had from rich, friable soil. Soil that is kept well manured or well supplied with thoroughly rotted leaves is excellent. Fresh manure should not be used immediately before planting. Good drainage is essential.

Fertilizing.—Well rotted manure may be used in large quantities, but never fresh manure just before planting. Decayed tree leaves that have rotted thoroughly, make excellent fertilizer. Lime may be used freely with these, if applied in the autumn. In the spring give a light dressing of acid phosphate and leunasalpeter or nitrate of soda. Where green manure has been turned under, a fertilizer composed of the following percentages of nitrogen, acid phosphate and potash, 5-10-5, may be used, at the rate of 750 to 1,000 pounds to the acre.

Planting.—Radishes are hardy and the first planting in spring is made as soon as the ground can be prepared. Planting is continued until about eight weeks before freezing weather, at about ten days apart for a succession. In hot weather it

RADISHES (BLACK WINTER)

RADISH (ICICLE)

is difficult to grow good radishes. Icicle is the only variety that thrives in hot weather without special care.

Radishes are frequently grown as a companion or intercrop between other vegetables. When planted separately, small varieties may be planted in rows placed as closely as they can be worked, and about an inch apart in the rows. Rows a foot apart will require 8 to 10 pounds of seed to the acre, 12 pounds broadcast. An ounce will sow 100 feet of row. Seed drills are used for large plantings.

The first thinning of the plants should leave them about half an inch apart. Pulling for market will give spacing sufficient for later development. Winter radishes require a spacing in the row of 2 or 4 or more inches according to variety.

Seed.—Earliness and yield will be increased by the use of large seed. Particular growers sift out all small or poorly developed seed.

Varieties.—There are many types of radishes varying in size, shape, color and season, such as Spring, Summer and Winter. The popular globe shaped are Scarlet Turnip, French Breakfast, and Vick's Scarlet Globe, the most popular early variety.

Cincinnati Market is the best of the long scarlet, short-top type. Roots are 6 to 7 inches long and are ready 35 days after planting.

Icicle is a long rooted, waxy white, 5 to 6 inches long. The earliest of the long rooted summer types. One of the best for growing in the open in summer. Forces well.

In the summer and autumn varieties, Chartier, a long, red, fading to white at the tip, and White Stuttgart, a large turnip-shaped, 4 inches in diameter, maturing in 6 to 8 weeks. A good keeper, with crisp, white flesh.

Among the winter varieties are Chinese Winter, 6 to 9 inches long. White skin, white flesh. Sow in August. Long Black Spanish, 7 to 9 inches long, almost black. Flesh white; flavor pungent. Sakurajima sometimes grows 20 inches long and 40 inches in circumference. The skin is white and the flesh crisp and tender.

The winter varieties can be stored like turnips and served, as wanted, throughout the winter.

Harvesting begins as soon as the roots are of edible size. The spring varieties become pithy and hot unless marketed as soon as they are ready for the table. The summer varieties remain in condition longer. The winter varieties may be stored and marketed throughout the winter. Radishes are pulled by hand and tied in bunches of various sizes. Anywhere from 3 to 12 according to variety and market demand. After bunching, they are washed to remove the soil and freshen them up. When shipped a distance, they are packed in baskets. Shipments from California and Texas are packed with a liberal supply of crushed ice.

Winter radishes have the tops removed and are otherwise handled like turnips.

Insects.—Plant lice, flea beetles and cabbage root-maggot are troublesome on radishes. Tobacco sprays with soap as a sticker are used to control lice. Corrosive sublimate solution, 1 ounce to 8 gallons of water, mixed in stone or wooden vessels, applied in a stream along the row will control the maggot. In handling remember this is a deadly poison. The flea beetle is difficult to control. Bordeaux is the only spray that will keep them away and this stunts the plants.

RHUBARB

Rhubarb is grown in almost every home garden and on a large scale commercially. The leaf stalks are used like fruit, in sauces and pies. Properly handled it is one of the earliest products of the garden.

A RHUBARB PATCH

Climate. The roots are hardy. Mulching in the autumn is often practiced but no protection is needed. Rhubarb does not thrive well in the South except at high altitudes.

Soil.—Rhubarb can be grown on almost every type of soil. Heavy soils should have plenty of decayed vegetable matter and sandy soil also needs plenty of rotted vegetable matter. Warm soils produce the earliest crops. Rhubarb requires a great amount of soil moisture and irrigation gives good results.

The bed should be made ten or more inches in depth and thoroughly pulverized.

Propagation.—Plants are readily grown from seed, planted early in spring, but the plants do not come true to type, so root division is the customary method. The roots are cut up into divisions having at least one eye or bud.

Planting.—Spring planting is preferred although, planting may also be done in the autumn. Where there is not hard freezing, autumn planting may be best. Spring planting should be done early, so the plants may have the benefit of a full growing season.

Plant the roots 3 to 4 inches deep, in rows from 4 to 6 feet apart and from 2 to 3 feet apart in the row, according to the character of the soil.

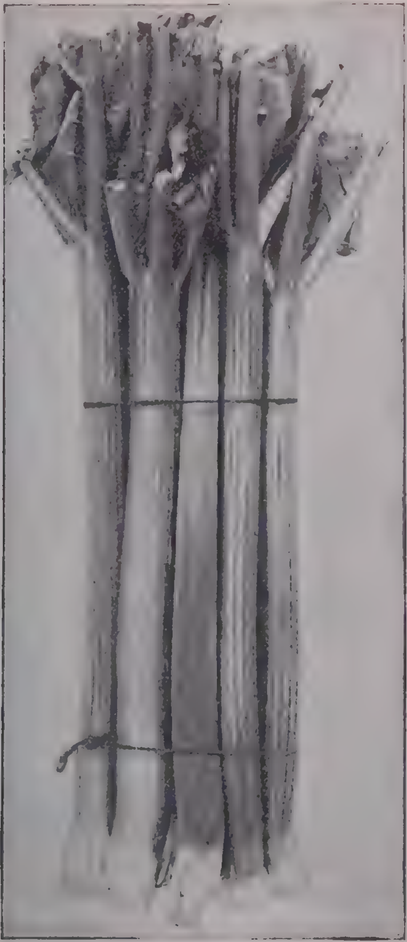
Fertilizing.—Rhubarb plants are strong and vigorous and therefore heavy feeders. The plants thrive in soil rich in vegetable matter and stable manure is especially valuable. It supplies plant food and retains moisture. Some growers use from 20 to 25 tons to the acre, applying in the autumn.

Early crops usually bring the best prices and the larger the stalks the better the price.

Where commercial fertilizer is used, a 5-8-8, that is, the percentage of nitrogen, acid phosphate and potash is used at the rate of 1,000 to 1,500 pounds to the acre annually.

Leunasalpeter or nitrate of soda can be used in moderate quantities throughout the growing season. These are used at the close of the harvest season to develop strong roots, as growth in the spring is from the food reserve stored up in the roots the previous season. Thus, a vigorous growth of foliage should be made after the crop has been harvested.

With proper care, rhubarb plants will produce for many



RHUBARB

years. When the plants become old and produce smaller stalks than formerly, the roots should be divided and reset.

Cultivation.—Give thorough tillage throughout the season as rhubarb requires great quantities of water and it should be conserved by frequent but shallow cultivation. If a mulch of manure is given in the autumn it is worked into the soil in the spring. Hand hoeing keeps the weeds down between the plants in the row. Cultivation encourages the necessary good growth after the crop has been harvested. Cut off the seed stalks as they appear as the production of seed weakens the plants.

Harvesting.—The plants should be allowed two years growth before taking a crop. The first crop, taken during the third season, should not extend for more than four or five weeks. Later the harvest may extend over eight or ten weeks, if the stalks continue of good size. The large stalks are pulled in harvesting, and the leaves are cut off immediately to prevent evaporation through the leaves, thus wilting the stalks. From two to eight stalks are neatly tied in a bunch, according to the custom of the market.

Forcing.—Rhubarb can be forced by lifting the roots in the late autumn. The large fleshy roots are packed in boxes of earth, to keep them moist and in good condition. They are set where the plants will freeze, but where the boxes will not freeze to the ground. After freezing, the plants are planted in boxes having about three inches of soil in the bottom, the plants set rather closely and covered with earth, taking care to fill in the spaces between the plants. These are set under a greenhouse bench, or in a cellar to throw up stems, or, they can be forced in hotbeds. A temperature of 50 degrees F. is sufficient.

Varieties.—Victoria and Linnaeus are the two most popular varieties.

RUTABAGA

Rutabaga.—Swedish Turnip or Turnip-Rooted Cabbage is somewhat similar to the turnip in its requirements, and the culture is the same, except that it requires several weeks longer to mature. The flesh is richer than the turnip. For early crops the seed may be sown under glass, the same as kohl-rabi. Gen-

RUTABAGA (LONG ISLAND)

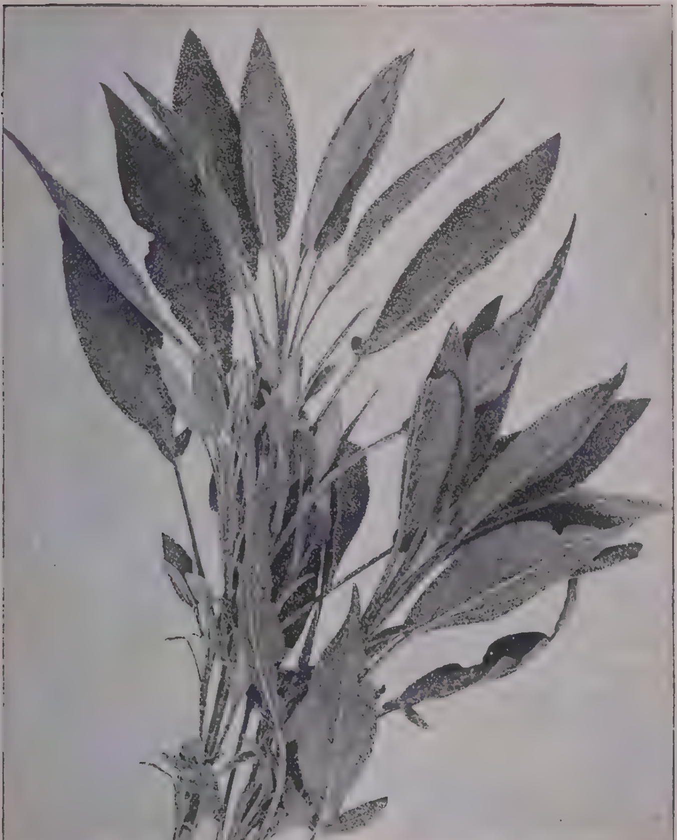
erally the seed is sown in the open ground as soon as it can be prepared in the spring. Rutabaga can be stored the same as other root crops and they keep better than turnips. Late crops are sown from the middle of June to the first of July. The rows are spaced from 16 to 30 inches and thinned to 8 inches apart in the rows. The roots are not injured by light freezing. In fact the eating quality is improved by a light frost.

Varieties.—American Purple Top is a good cropper and keeper. It is large, of good shape, has small neck and a smooth skin. Fine for stock feed. Laing's Garden has purple skin and yellow flesh; needs frost to improve eating quality. Purple-Top Yellow is productive and a good keeper. Has yellow, fine-grained flesh, free from fibre. White-Fleshed Neckless has white skin and flesh. The roots are large and solid. Good for table use or cattle feeding.

One ounce of seed will plant 400 feet of drill, 1 to 2 pounds to the acre in drills, 3 to 5 pounds broadcast.

SAGE

Sage is a perennial and when established will last for years. The dried leaves are used for seasoning. Sow the seeds in the open ground in the spring and thin the plants to six inches to a foot apart. The seed may be started under glass and transplanted to the open when the weather is favorable. It is also propagated by cuttings, layers and by dividing the plants. In the North it is advisable to mulch the plants for winter protection. Make only one picking the first year, so as not to weaken the plants, thereafter three pickings may be made each season.



'SAGE"—SALVIA OFFICINALIS

SALSIFY

Salsify or vegetable oyster is not largely used in this country. The roots are cooked like parsnips and used in stews. The roots are long and tapering, about two inches in diameter at the top. They may be left in the ground over winter. Salsify can be grown in any good soil but the best roots are produced on light soil.

SALSIFY

The culture is the same as for parsnips. The seed may be sown one inch deep, as soon as the ground can be prepared in the spring, in rows from one to two feet apart, thinning the plants to three inches apart. Before the ground freezes a supply of roots is dug and stored in moist sand for winter use. The remainder left in the field for use when the frost is out of the ground in the spring, when they are removed before new growth starts.

The roots are prepared for market by cutting away the leaves down to about two or three inches above the roots. The roots are then washed and tied in bunches of ten or twelve.

SWISS CHARD
(Fordhook Giant)

SAVORY

Savory.—Summer savory is an annual and winter savory, a hardy perennial. Savory is grown for its leaves which are used for flavoring, sometimes when green, but more often when dried. The seed is sown in the open ground or may be started under glass. The rows are spaced closely if wheel hoes are to be used in cultivating and wider for horse cultivation. The plants are thinned to stand from six to twelve inches apart in the rows.

SAVORY (SUMMER)
Garden Herbs

SHALLOT

Shallot.—Shallots are used for seasoning, the flavor being milder than the onion. The leaves are used in salads and soups. Shallots produce compound bulbs called cloves. Any soil suitable for onions will grow shallots. The cloves are planted in the spring in the same manner as garlic. The culture is the same as for onions. The bulbs are harvested when the leaves begin to ripen and left on the ground for a short time to dry. They are then divided and stored in a cool dry place.

SPINACH

Spinach is an annual and is the most important crop grown for greens. The production of spinach is increasing as its importance in the diet is becoming understood.

Soil.—Spinach grows well on any good soil which is well drained. The soil should contain plenty of vegetable matter so it will be constantly moist. Sandy loams produce the earliest crops. Spinach does well on muck soils.

In the market garden section of Virginia spinach is grown in slightly raised beds about six feet wide, which insures good surface drainage. The soil should be deep and thoroughly pulverized.

Fertilizers.—Where fresh manure is used, it is applied heavily to the preceding crop. Where commercial fertilizer is used, it is applied heavily, at the rate of 1,000 to 2,000 pounds to the acre, in several applications during the season. An 8-5-2 in the order of percentage of nitrogen, acid phosphate and potash. Some growers obtain good results by using a mixed fertilizer early and supplementing this with applications of nitrogen during the growing season.

Planting—In the South and California, spinach is grown as a winter crop. For winter and spring use, sow in September and mulch on approach of severe weather, although this is unnecessary in many sections. The plants should become established before cold weather. As spinach is hardy it will stand freezing. For spring and early summer use, the seed is planted as early in the spring as the land can be prepared. August heat causes spinach to produce seed stalks. New Zealand is the only spinach that will stand the severe heat of August. Space the rows 10 inches apart, or 15 inches where hand cultivators are to be used. Thin the plants to stand from 4 to 6 inches apart in the rows. An ounce of seed will sow 100 feet of row. Ten to twenty pounds of seed, in drills, will be required per acre. A quarter pound will sow 200 feet of drill.

Cultivation.—Give clean but shallow cultivation. Keep the crop free from weeds.

Harvesting may begin as soon as the plants are of marketable size, having six or more leaves and harvesting is continued until just before the seed stems develop. For large yields the plants must be allowed to fully develop, although market prices may warrant harvesting when the plants are smaller. Medium to large, tender plants are desired. Two or more cuttings may be made, taking the larger plants first.

Various implements, from knives, hoes, etc., to special tools made for the purpose, are used for harvesting, cutting the root below the lower leaves. The plants are gathered carefully so as not to damage the leaves, placed in crates, removed to the packing shed where they are trimmed. The dead and discolored leaves should be removed. Where the crop is grown for canneries, the trimming is done at the cannery.

Spinach should be cut when dry, as the leaves heavy with rain break easily, and the value of the crop is thereby lessened.

Marketing.—For local markets spinach is washed, which improves its appearance, but for long-distance shipping washing is injurious. It is packed in hampers and ventilated barrels. When shipped over long distances, ice is placed on top of the package.

SPINACH (VICTORIA)

Varieties.—The Rhode Island Experiment Station has divided the varieties of spinach into four groups:—

I. **Norfolk or Bloomsdale.**—Plants vase form, leaves broad, thick and supported by their stalks, so they do not naturally rest upon the ground. Blossom stalks appear at an early age. Bloomsdale and Norfolk Savoy belong to this group.

II. **Round-leaved Spinach**—Plants compact in habit of growth with leaves conspicuously rounded in outline and formed close to the ground. Tissue firm, color dark green, blossom stalks formed tardily. A slow growing spinach. Victoria belongs to this class.

III. **Thick-leaved Spinach.**—Plants large, leaves large and spreading out upon the ground, ends and lobes of leaves more or less pointed. A highly prized type of spinach, both for spring and autumn planting, on account of large size and rapid growth. Long Season belongs to this class.

IV. **Prickly Seeded Spinach.**—Plants variable; leaves often with long, slender stalks and narrow blades. Seed with horn-like projections. Not readily sown with seed drills. Hardier than other varieties. This variety does not sell well in many markets on account of its appearance, although the quality of the leaves is good.

King of Denmark, or Danish King, is a new spinach that stands longer than other varieties before running to seed. It is of good quality and a heavy yielder. Sow seeds early and make successive sowings every 10 days. In the South sow in September and October.

Victoria has round, thick, broad dark-green leaves somewhat curled, of good quality. Hardy.

Bloomsdale or Norfolk Savoy-Leaved. Runs to seed quickly in hot weather. Used for autumn sowing to winter over for use in the spring.

Long Season is small but compact. Heavy yields on good soil.

Insects.—Spinach aphis is a yellowish green plant louse. It sucks the juices of the plants and carries spinach blight. The insects work on the under side of the leaves and are difficult to control. Dusting with hydrated lime containing 2 to 3 per cent nicotine is recommended by entomologists. A non-poisonous liquid spray, the basis of which is pyrethrum gives good results in control of spinach aphis.

Beet Leaf-miner, a white maggot, burrows in the leaves. Plow immediately after harvest and keep the field free from weeds and trash. Plant early in the spring, or late in autumn when the miners are not active.

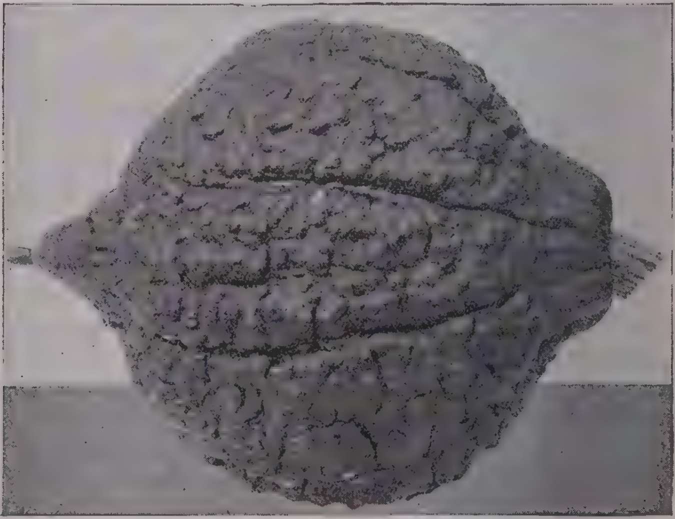
Diseases.—Spinach blight or mosaic is very destructive in Virginia and some other regions. The young leaves are yellow and malformed. Later, growth of the plant ceases and the leaves are mottled. There is no known remedy at present.

New Zealand Spinach is not a true spinach, but resembles it and is used in the same manner. The spreading plants often cover a space three feet wide or more, during summer and two feet high, from seeds sown in April. Soak the seed in warm water for a few hours before planting.

New Zealand spinach thrives in hot weather, affording greens when fresh spinach cannot be had.

The seed should not be sown until the ground is warm, as it will not germinate in cold soil. Plant in rows 3 feet apart and thin the plants to stand 2 feet apart in the rows. The seed may be planted in hotbed or greenhouse, late in the winter or early spring, transplanting into pots while the plants are small, so they can be set out without disturbing the roots. The culture is the same as for spinach.

Both the leaves and stalks of New Zealand Spinach are of good quality when cooked.



SQUASH (HUBBARD WARTED)

SQUASH

Squash.—Physicians have discovered the great importance of vegetables in the diet, largely on account of the vitamins they contain. Tomatoes, spinach, lettuce, cabbage and other vegetables are important on this account. Summer squash is high in vitamins and is recommended in the diet.

Soil.—Any good soil that is well drained will produce a good crop of squash.

Culture.—Squash should not be planted in the open ground until it is warm. Squash is not as tender as melons or even cucumbers, but is easily injured by frost. Squash can be planted when it is safe to plant corn. Squash does not require as long a growing season as melons and can therefore be grown nearly all over the United States and in some of the Canadian provinces.

The plants are often started under glass like cucumbers or muskmelons and increased earliness from this treatment is more marked than with any of the other curcurbits or vine crops. Summer crooknecked is quite largely grown in this manner.

The bush varieties are sown in hills about 4 feet apart, each hill enriched with a couple of forkfuls of well rotted manure. If manure is not obtainable use a liberal supply of imported peat moss, mixing with it a good, complete chemical fertilizer. Sow 12 seeds in each hill and thin to three or four plants. The winter or running varieties require 10 to 12 feet each way. Squash is also planted by the drill method, the seeds sown in the row and thinned to stand at the same distances as by the hill method.

Winter squash requires a little nitrate as soon as the plants are up to insure a vigorous start.

The culture for squash is generally the same as for melons.

Squash is often started in hotbeds and the frames removed when the vines are large. Small frames are sometimes used over each hill, to give the plants an early start.

One ounce of seed will plant 25 hills, 3 to 4 pounds is required per acre.

Harvesting.—The bush or summer squashes are harvested as soon as they are large enough and before the rind hardens very much, if supplied to a local market. If to be shipped long distance they must be somewhat ripe so the rind will be sufficiently hard to stand shipping, but not completely hard.

Winter squashes should not be harvested until the shell is hard, the harder the better, and the fruit matured, but before they are frosted.

Squash, like pumpkins, are cut from the vine, with a short piece of the stem attached. Decay is likely to start at the scar, if the stem is removed.

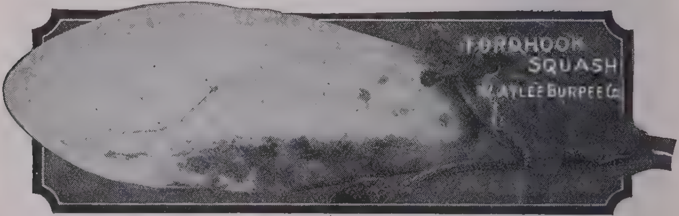
The fruit should be carefully handled so as not to bruise or break the skin, which is likely to cause decay.

Squashes are usually shipped in barrels.

Storage.—Squashes should be placed in small piles to ripen, after picking, if there is no danger from frost. Then they should be handled very carefully, laid in a burlap lined, spring truck and hauled to the storage room. The storage room should be dry and at a temperature of about 60 degrees F. maintained for

SQUASH (SUMMER CROOKNECK)

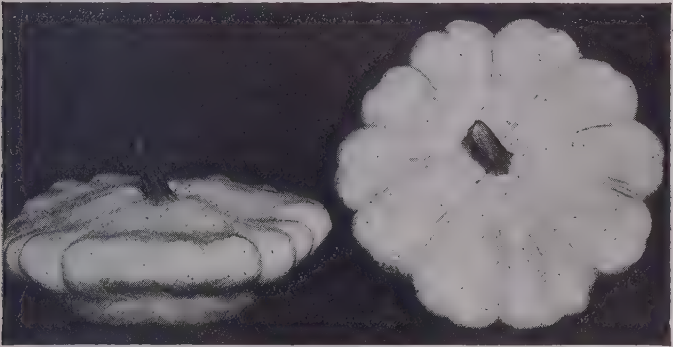
two weeks, to harden the shells. It should be kept thereafter at from 50 to 60 degrees. The storage house should be thoroughly insulated, well ventilated and heated. The squashes are stored on shelves made of one inch material, cut three inches wide. These are placed three inches apart to insure good ventilation. Only one layer of fruit is placed on a shelf for best results, although three layers may be placed, one on the other, if carefully handled. The object of storing is to obtain a higher price in the late market, in January and February. For crops grown in the home garden, squashes can be kept on shelves near the furnace.



SQUASH (FORDHOOK)

Varieties. Summer Varieties.—Early Bush Crookneck is the best known of this class. It is the old Yellow Summer Bush Crookneck. Giant Summer Crookneck is larger than the former. Early White Bush. There are two varieties of a flat, round scalloped summer squash, White Bush Scallop and Yellow Bush Scallop. Italian Marrow or Cocozella is a delicate and fine flavored summer squash, known in some localities as summer asparagus. Bush Fordhook is somewhat similar to the above. The last two sell in city markets where they are known.

Winter Varieties.—Hubbard is the most popular of the winter varieties. There are many strains of this variety and it is well to test seeds from various sources by growing a hill from seed obtained from different dealers, finally selecting and using only the best strain. Another plan is to see squashes of a satisfactory strain and select the seed that produced them.



SQUASH (WHITE BUSH)

Warted Hubbard, similar to above. Large, handsome fruit, but not of as good quality as Hubbard. Blue Hubbard. A gray-blue in color. Large and good keeper, with a hard shell.

Boston Marrow, good for pies and canning. Delicious, is of fine flavor and dry; of better quality than Hubbard. The flesh is dry, sweet and of fine flavor. The shell is green, thin and hard. The flesh is thick, of deep orange.

Insects.—Squash bugs and vine borers are troublesome. The squash bug can be kept in check by hand picking. Soapy water with flowers of sulphur is used by some growers. The bugs may be trapped under boards placed near the plants. Covering the plants with mosquito netting is also resorted to. Spraying with nicotine or dusting is recommended. Burn all trash in the autumn.

To repel the squash vine borer, place a handful of tobacco dust close around the plants. The vines may be slit with a pen knife and the borers removed where found. Cover the nearest node to the incision with earth and the vine will take root there. Also cover the part of the vine where the incision was made.

Diseases.—Squashes are not usually seriously injured by diseases. Anthracnose is sometimes troublesome. See remedy under Watermelon. Bacterial wilt is caused by bacteria, carried by insects. A cut stem will show a sticky ooze which will stick to the finger and can be drawn out into fine threads. Pull up and destroy diseased plants as soon as noticed.

Downy mildew attacks the plants sometimes during warm, moist weather. Yellowish spots appear on the foliage; they later curl and die. The oldest leaves are affected first. Spraying with Bordeaux-lead when the disease first appears will keep it under control. The lead will control the yellow-striped beetle.

THYME

Thyme is an herb used for seasoning. It is propagated by seeds, root division and layers. The plants are set 6 inches apart in rows 3 feet apart or less. Thyme can be grown in any good soil that is well drained. The leaves are picked and sold fresh and also dried and used during the winter. The seed can be sown where the plants are to grow or in a seed bed and transplanted. The method around New York City is to sow the seed thickly in a seed bed, as soon as the ground is warm in the spring. The plants are transplanted in July, in rows a foot apart with nine inches between the plants. The crop matures by October. Thyme is perennial but it is advisable to renew the bed every two or three years. The broad-leaved variety is generally used.

TOMATO

Tomato.—The tomato is native of tropical America. It was known and grown in Europe two hundred or three hundred years ago, but not much longer than forty years ago there was more or less prejudice and superstition regarding the tomato in this country. On a seed farm known to the author, many acres of flowering plants and vegetables for seed were grown years ago. In passing the fields of tomatoes it was quite common to hear visitors express their belief that tomatoes caused cancer and they could not be induced even to taste them. Now it seems impossible that such a belief could have existed, with physicians recommending the use of tomatoes for children, on account of their high vitamin content.

The tomato is one of the most important truck crops in the home garden and for greenhouse culture.

According to the census of 1920, the value of the tomato crop at that time was $38,675,496. The crop along the Atlantic states suffered severely in 1919 and the yields in several states was considerably below the average. Maryland, New Jersey, California, Delaware, Virginia, Indiana, Florida, New York and Ohio were the leading producing states in the order named. The above estimate made during a year of poor crops, is naturally below the average.

Climate.—The tomato is a tropical plant and flourishes in heat and sunlight. Eighty to 90 degrees F. during the day and 15 degrees lower at night is ideal although tomatoes are grown under a wide range of climatic conditions.

As far north as Monmouth County, New Jersey, the plants are set out in sandy loam early in May.

A fairly good rainfall is essential.

Soils.—As with other crops, a sandy loam is preferred for early crops. Heavier soils give somewhat better yields. Any good, rich, well-drained soil will produce a good crop of tomatoes. The soil should contain liberal quantities of decayed vegetable matter, be worked deeply and put in the best mechanical condition possible to have the soil thoroughly and deeply pulverized.

For early crops the matter of location is important. Land level or slightly sloping to the south and protected from cold north and prevailing east or west winds is desirable.

Fertilizing requirements for tomatoes depend upon the character of soil in which they are grown. Rich soil of a heavy nature may require little or no fertilizer. Where the growing season is short, even rich soil may require some complete fertilizer. The nitrogen should be in available form to give the plants a quick start. Acid phosphate and potash are required to hurry ripening. Early crops need more fertilizer than late crops. On most soils a 4-8-10 in percentage of nitrogen, acid phosphate and potash is used in amounts varying from 500 to 1,000 pounds per acre. The agricultural experiment stations of the various states make quite different recommendations for the use of fertilizer based on different types of soil. The fertilizer should be applied before planting.

The U. S. Department of Agriculture suggests that tomato growers make fertilizer tests, using the plots for each test, as follows:—**No. 1,** ½ pound of nitrate of soda. **No. 2,** ½ pound muriate of potash. **No. 3,** 2 pounds acid phosphate. **No. 4,** ½ pound nitrate of soda; ½ pound muriate of potash. **No. 5,** 2 pounds acid phosphate, ½ pound muriate of potash. **No. 6,** ½ pound nitrate of soda, 2 pounds acid phosphate. **No. 7,** ½ pound nitrate of soda, 2 pounds acid phosphate, ½ pound muriate of potash. **No. 8,** check plot, no fertilizer.

TOMATOES (BONNY BEST)

Carefully count and weigh the fruit from each plot of ten plants, being sure to keep a record of the fertilizer used on each plot. This will show what fertilizer will be best for that particular type of soil.

When manure is used for tomatoes, it is applied heavily to the preceding crop. Clover sods are good for a late crop. Green manures are largely used. Early spring plowing and frequent and thorough harrowing are necessary for best results.

Seed.—What has been previously stated, must be repeated in the case of tomatoes. Avoid cheap seed. Canners and catsup manufacturers sell seed at a low price. It is naturally mixed seed and a uniform type cannot be grown from it. Trustworthy seedsmen do not handle it. Obtain seed from a source known to be reliable, to avoid loss.

Growing Plants.—Plants are started in very carefully prepared seed beds. Early plants are started in a greenhouse, hotbed or coldframe.

The best plants are produced by slow growth—not stunted growth from insufficient heat, but natural growth, with plenty of light and air and without crowding. Plants kept too long under glass, or having insufficient light and air, become drawn, long and spindly and give poor results.

If the plants are started under conditions where they must be set in the field from the seed bed without transplanting, the seed may be sown five or six weeks before the plants will be wanted. Where the crop is wanted for early market or where the growing season is short, the seed is sown from 10 to 12 weeks before the time to set the plants. The seed is sown in shallow boxes, called flats, in rows two inches apart or in hotbeds or greenhouse benches. When about two inches high, the seedlings are transplanted, setting them two inches apart each way, where they are left until they begin to crowd when they are again transplanted 3 or 4 inches apart each way or put in flower pots or paper pots. At no time permit the plants to become crowded. The seed may be sown directly in the pots, if the space can be devoted to them from the start, under glass. Put seed enough in each pot to secure a stand and thin to one plant to a pot.

As the plants become large, watch for the crown clusters of flowering buds and remove them. The object is to develop branches which will each produce flowers. Ripe tomatoes may be harvested in about 45 days from the time the plants are set out.

In the South where tomatoes are grown for canneries, the seed is sown in the open ground, in carefully made beds and the plants set out when they are about six inches high. One ounce of seed will produce about 2,500 plants.

A GOOD TOMATO PLANT

Planting.—Tomatoes should not be set out until danger of frost has passed. The plants should be checked in growth as little as possible in transplanting and the plants hardened off before they are set. The earlier the plants can be safely set, the larger the crop will be.

Planting distance is determined by the variety grown, character of the soil and the method of cultivation. Plants pruned to one or two stems and supported can be planted much closer than plants not pruned and allowed to spread on the ground. On light soils for early varieties 3 by 3 feet apart will be right, while 4 by 4 may be the distance for late varieties.

Plants are set by hand for small plantings and with machines for large areas. Machines do not handle large plants very well, and these can be set rapidly by hand in a furrow made with a small plow.

Pruning and Training.—In greenhouse culture, pruning and training are necessary, the single stem system being practiced generally.

Pruning and training saves space in small gardens and keeps the garden looking neat. It is used somewhat in garden culture—more generally in the South than elsewhere. Some of the advantages claimed for pruning and training are that these ripen the fruit earlier; plants are freer from disease; larger and more perfect fruit which is clean when picked; spraying is done better and easier; cultivation can be done later and easier; fruit harvested more conveniently. The objections to this system are the cost of stakes and labor of tying and training the plants; more plants are required per acre; stakes must be removed and stored.

When trained to a single stem, the side shoots are pinched out. The plants are tied to the stakes with soft cord placed under a leaf stem on the plants in such a manner as not to interfere with the proper expansion in the circumference of the stem and then the cord is firmly tied to the stake. The top of the plant is pinched off when it reaches the top of the stake.

Where two or three stems are grown, each stem is tied as in the single system and all others removed.

The stakes used are about 1½ inches in diameter and 5 feet long.

In some cases, tomato plants are supported without pruning by stakes. The plants are trained up through barrel hoops, nailed or wired to stakes or by similar supports.

Careful tests indicate that larger crops of equally good fruit are produced in the North without pruning or training. In the South, where diseases are severe, training and staking may be beneficial. Pruned plants may suffer more from drought than unpruned.

The tomato grows a large amount of vine and a heavyweight of fruit, mostly water. It requires ample moisture, but also requires good drainage.

Cultivation.—Clean cultivation is necessary to good fruits and large yields. When the plants have attained some size, the cultivation should be shallow. When the vines cover the ground, the tall weeds are pulled by hand.

Harvesting.—The proper time for harvesting depends upon the purpose for which the fruit is to be used, distance from market and danger from frost. Tomatoes for canning must be ripe; those for nearby markets are not allowed to ripen quite so much as tomatoes for canning, as they must stand two or three days in the market. For long shipments, such as tomatoes from Florida for the New York market, the fruit is picked green, ripening on the way or in the market. Ripening houses are now used in Florida where the fruit is slightly ripened in heat after it has been picked green. It is then graded, wrapped, packed and shipped.

Tomatoes picked before they are ripe are never equal in quality or flavor to fruit ripened on the vines.

Green tomatoes "ripened" by gas are not ripe tomatoes, but green tomatoes artifically colored.

Grading.—Tomatoes should be graded according to size and ripeness, discarding inferior specimens.

Packing and Marketing.—The tomatoes should be cleaned when they are graded. For local markets, hampers or peach baskets are used. For shipping to distant markets, flat peach baskets are used to prevent the fruit crushing. These are placed in four or six basket carriers.

Tomatoes for canneries are packed in crates or baskets without grading or cleaning.

Yields.—The average yield is probably about 100 bushels to the acre. Good soil, good seed and good cultivation should produce 500 bushels.

It is the very early crop in market that brings the highest price, while late in the season the price may fall so low it will scarcely pay to pick and haul the crop. Roadside markets offer an opportunity to dispose of the crop at more favorable prices than are sometimes obtained at market. Under glass the idea is to produce a crop after the field crops have gone and before they bear again.

PICKING TOMATOES

Varieties.—Varieties that are practically alike are offered under different names. Strains of the same variety from different sources differ as much or more than some listed as different varieties.

In selecting varieties the purpose should be considered, whether for home market or for shipping, for canning or catsup or for family garden. For market, earliness is important and color according to market demand, while for canning, quantity as well as quality is desirable.

Earliana is the most popular early variety. Color is bright red, large size and good quality. Be particular to get a good strain of seed. Not a good shipper.

Bonny Best is as early as Earliana and considered equally as good. Fruit is red, solid, smooth and of better quality than Earliana.

Chalk's Jewel and John Baer are quite like Bonny Best.

Wayahead is a smooth, solid, deep red tomato with potato-leaved foliage. It ripens before Earliana. The flesh is solid.

June Pink is popular where pink tomatoes have the preference in market. Does not yield as well as Earliana.

Early Detroit or Globe is a pink tomato of good size, smooth, globe shaped fruits, firm and of excellent quality.

Where the season is short, early varieties should be grown for canning to insure harvesting the whole crop before frost.

In the late varieties Stone is the most popular for market and canning. The plants are robust and prolific. The fruit is solid, bright red, smooth and of good size.

Beauty is a late purplish-pink. Vigorous heavy bearing vines. Fruit large, smooth; skin thick.

Forcing Tomatoes.—Good varieties for greenhouse culture are:—

Best of All. The fruits are smooth, round and the vines are prolific. Fruit is scarlet red and sets in bunches.

Comet. Fruit is of medium size, of deep scarlet.

Stirling Castle is a heavy cropper of medium size, smooth and round. Fruit clear red.

Sunrise. Fruit of fine quality, of medium size, round, produced in long clusters. Considered the best indoor variety.

Tomatoes in a greenhouse must be pollenized by hand with a camel hair brush, or by having a hive of bees in the greenhouse to do the work. In this latter case the ventilators should be screened to keep the bees in.

TOMATOES (HUSK)

Husk or Strawberry Tomato is really a *physalis*. The small yellow fruit is enclosed in a husk. The fruit is very sweet, good for preserving and for pies. The berries may be put away in their dry husks and kept through the winter. Seeds may be sown in the open ground as soon as the weather is warm.

Insects—Cutworms often destroy the young plants. A collar of cardboard or similar material around the plants will afford protection. Poisoned baits may be used such as sweet clover tips dipped in a weak solution of arsenate of lead and laid near the plants. Surplus stock should be in reserve to fill vacancies.

Tomato Fruit Worm eats into the fruit in the South. It is the same as the corn ear worm. Spraying with arsenate of lead will afford control.

Hornworms or tomato worms, large green worms, eat the foliage. Hand picking and spraying with arsenate of lead is the remedy.

Potato bugs sometimes trouble tomatoes, the arsenate of lead spray controls them.

Plant lice, if troublesome are checked by spraying with nicotine in the arsenate of lead or in solution with water.

Diseases.—Leaf Spot is indicated by water soaked spots on the leaves which turn brown. The leaf turns yellow, the edges roll and the leaf dries and falls off. Leaf spot is most serious in wet weather.

Spray the plants in the seed bed once a week, with a 3-3-50 Bordeaux Mixture and the plants in the field with a 5-5-50

TOMATOES
(Stirling-Castle)

Bordeaux. The first figure representing the number of pounds of copper sulphate; the second, stone or hydrated lime in pounds and the third gallons of water.

Sterlize the soil of the seed bed. High pressure steam 1 to 2 hours; low pressure steam in sub-drains, 4 to 5 hours. Rotate crops so tomatoes will be planted on same land only once in three years.

Early Blight. Similar to leaf spot. The spots on leaves are brown or black. Stems also show dark spots and the fruit may be spotted. This is considered the same disease as that causing early blight of potatoes. The remedy is the same as for leaf spot.

Late Blight. Black, water-soaked spots appear late in the season on the older leaves and stems. The leaves die and the stems rot. The fruit is discolored at the stem end. If the outbreak is severe the plants die. This disease is thought to be the same as late blight of potatoes. Spraying with Bordeaux is the remedy.

Fusarium Wilt.—This disease is indicated by the plant wilting, and the leaves rolling upward and inward. The leaves turn yellow and die, the lower leaves first, followed by the upper. A stem cut crosswise will show a brown discoloration between pith and bark. This discoloration is the way the disease is identified.

Wilt-resistant varieties should be grown. Several wilt-resistant varieties have been developed, including Arlington, Columbus, Marvel and Norton.

Bacterial Wilt.—Black discolorations appear on the stem. When cut, a milky slime discharges from the stem. The plants wilt suddenly. This disease is carried by insects and by tools as it can only enter the plants through a wound.

Make the seed bed on perfectly fresh soil not used previously for tomatoes, or sterilize the soil with steam, or by drenching with a formalin solution, 4 pounds of formalin to 50 gallons of water.

Inspect the growing crop frequently and promptly remove and burn every affected plant.

Rotate crops, not growing tomatoes or related crops on the same land oftener than once in four years.

Keep plants free from all insects and do not plant tomatoes in land infected with root-knot nematodes.

Mosaic.—Abnormal leaf development indicates this disease; green mottled or perhaps fernlike foliage. Most troublesome on greenhouse crops. It affects a large number of related plants, including weeds, and spreads rapidly, through insects and in handling the plants.

Keep beds and land free from weeds and insects under control.

Blossom-end Rot.—A small yellowish spot appears on the fruit around the dried blossom. The spot turns dark and increases in size. Most prevalent in dry seasons. Thought to be due to a sudden check in moisture supply.

Conserve moisture by cultivation or irrigate the crop. Pruning and staking seems to increase the difficulty.

Blossom Dropping.—This trouble may be caused by a sudden drop in temperature when the plants are in blossom or by hard rains; injury by insects; drying winds or too much nitrogen in the soil.

TURNIPS (WHITE MELON)

TURNIP

Turnip.—When planted early in the spring, the turnip is an annual, but when planted in the autumn it is biennial. It belongs to the genus *Brassica* and the family *Cruciferae* which includes mustard, cabbage, cauliflower, rape, etc.

Climate.—The turnip thrives in a cool moist climate and does not do well in hot summer weather, maturing in about 8 weeks from the sowing of the seed.

Soil.—The turnip is grown on a great variety of soils, but the best specimens are produced on deep, light loam. For large yields of high quality the soil should be fertile and moist.

Fertilizing.—Manure or green manure should never be applied immediately before planting turnips, although the soil should be well supplied with vegetable matter. This should be given to the preceding crop. The culture of turnips is practically the same as for beets, though beets are more heavily fertilized. Turnips require liberal amounts of acid phosphate and potash, but only small quantities of nitrogen. Quite generally, the only fertilizer turnips get is what was applied to the crop which the turnips follow, although a small amount of fertilizer applied to the turnips would be profitable.

Planting.—For an early crop the seed is sown as soon as the ground can be prepared. For late crop the seed is sown in July or August, following some crop which has been harvested. In the South the seed is sown during autumn and winter. The seed is often sown broadcast in well prepared soil and raked in lightly. This is usual on forms where the crop is grown for stock feeding. This method takes considerably more seed and produces smaller yields than growing in rows.

For uniform size, high quality and good yields, the seed is sown in drills about a foot apart for hand cultivation and from 24 to 30 inches for horse cultivation.

The seed should be dropped about an inch apart in the furrow, if it is good seed, and covered half an inch with soil. About two pounds of seed in drills will be required to the acre. One ounce will sow about 200 feet of drill. For early crop the plants should stand about 3 inches apart for the smaller varieties. Larger varieties grown to full maturity will require spacing of 6 inches apart. The plants removed can be used for greens, cooked the same as kale.

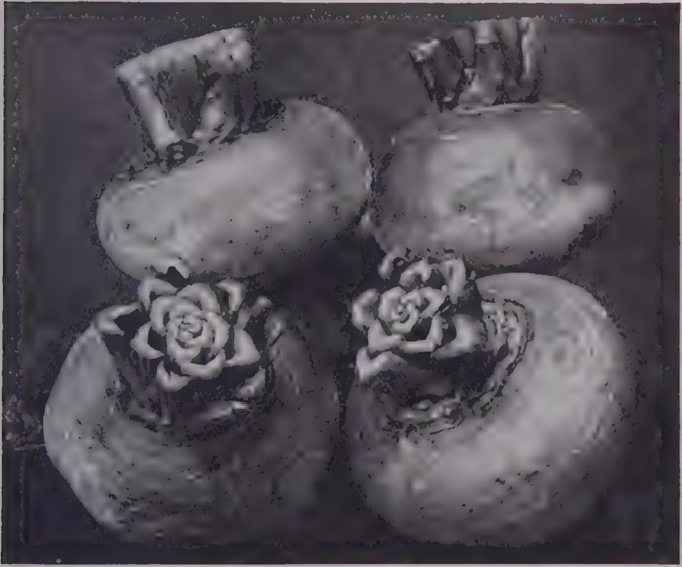
Cultivation.—When grown in rows, clean cultivation should be given to keep down weeds and conserve moisture. Turnips respond well to good cultivation. Hand hoeing and weeding is necessary to keep down weeds in the rows. Seed sown broadcast does not permit cultivating the crop.

Harvesting.—Turnips for bunching are harvested as soon as they are about 1½ inches in diameter. This may be a thinning process, removing the larger and leaving the small turnips to develop. The turnips are pulled by hand and dead and injured leaves removed. About 6 are tied in bunches and washed.

The crops harvested in the autumn have the tops cut off as soon as pulled, the turnips are then packed for market or stored.

Turnips are stored in pits or in storage houses. The best temperature is near the freezing point, but they must not be allowed to freeze.

Insects and Diseases.—Club root is one of the most troublesome diseases. Black rot is another disease of the turnip. These are fully treated under Cabbage. Aphis may need attention. Spraying with tobacco solution keeps aphis in check.



TURNIPS (PURPLE TOP)

Maggots are a cause of annoyance at times. Carbolic acid emulsion, ¼ pound soap, ⅙ pint crude carbolic acid and 1 gallon of water, used around the plants will kill the maggots.

Turnips should be grown in rotation with plants other than mustard, cabbage, cauliflower, rutabaga, rape or radish.

Varieties.—White varieties are in common use. Yellow varieties are preferred by some. In some Eastern markets white varieties are not plentiful. Flat varieties are preferred in some markets but the rounder varieties seem to be generally preferred. In shape, the roots are round and flat, oval and conical. Seven Top is a variety much grown in the South for the tops, which are used for greens.

Purple Top Strap-Leaved is a good table variety. Early White Milan is one of the earliest, tender and sweet. White Flat Dutch is good when not overgrown, otherwise it will be poor.

Purple Top White Globe, is firm, fine grained and sweet and keeps well; a splendid table variety. White Egg is quick growing, egg shaped, smooth, white, growing half out of the ground, never rank or strong. Although this is a field variety, largely grown for stock, the flesh is firm, mild and of good flavor. White Globe is a large white turnip good for table and stock.

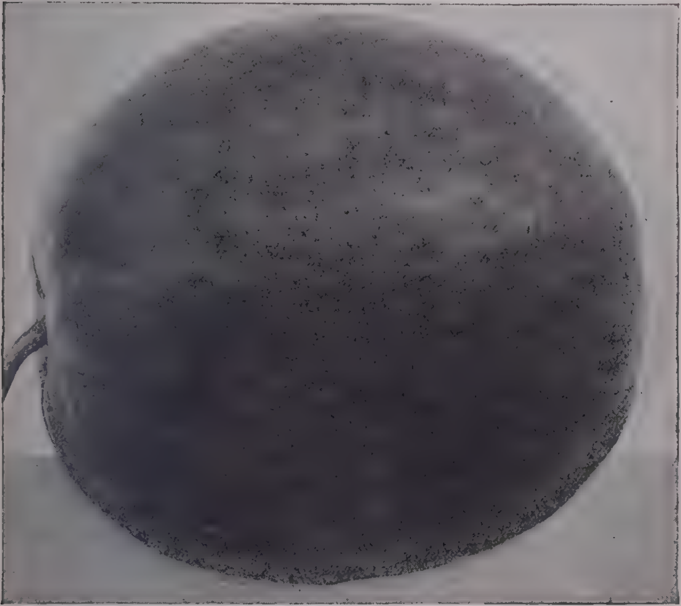
WATERMELON

Watermelon.—The watermelon is a native of Africa and has long been in cultivation. The Israelites in the desert lamented for watermelons.

The watermelon is not of much commercial importance as grown in the North, where it is grown chiefly in home gardens. Its importance in the South may be better understood from the 1920 census report, showing the value of the watermelon crop the previous year to have been $10,466,133.

Strange to say that Iowa that year had planted more acres to watermelons than Tennessee or Maryland.

Soil.—Watermelons do best on sandy loam. Good drainage is necessary. Watermelons will not do well on poorly drained soil.



WATERMELON (FORDHOOK)

Climate.—The watermelon thrives best in the South where the seasons are long and the temperature high day and night. Here the plants can be safely started early and grown over a long period.

Soil.—The preparation of the soil is the same as for muskmelon.

Seed.—Large growers are particular as to their seed and some save their own seed, as the individuality of the plants as well as the fruit must be considered. The seeds are selected only from the center of the melons. The seed, if properly stored, is good for at least four years, so the seed is not always saved annually.

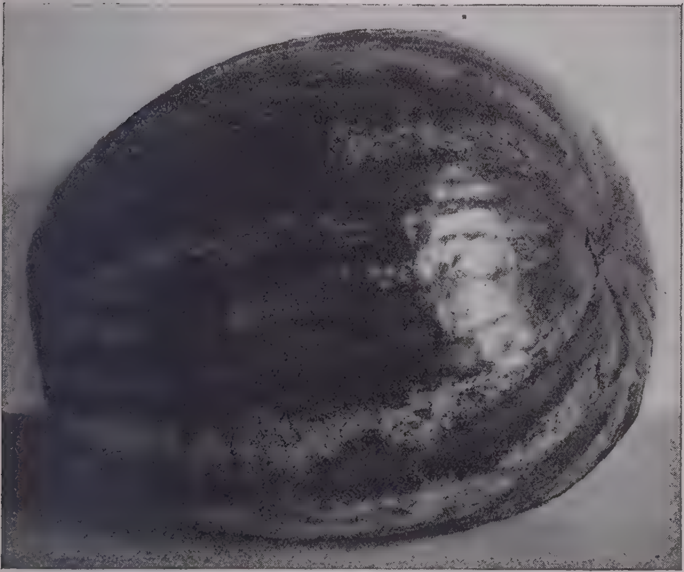
One watermelon seed grower in Florida has two very large plantations and grows nothing but watermelon seed, for seedsmen.

Planting.—Watermelons are planted the same as muskmelons, but require a longer growing season and more room for the larger vines. The vines must have fully four months growth. In the North the vines should be started in hot beds or under small frames—miniature hotbeds, large enough to cover one hill. When the plants are well up and the weather warm enough, the frames are removed and the plants allowed to spread.

The plants are also grown in greenhouses or hotbeds in paper pots. Several seeds are planted in each receptacle and thinned to a single plant, or to two plants in each.

When the plants are set in the field, the bottoms of the pots are torn off and the pot set in the ground without disturbing the roots. The pot recently introduced known as Growell, is an excellent pot in which to start watermelons. The pots are planted with the plants in them, the roots growing through the pots.

In the South the seed is sown in the field, about 10 seeds to a hill, with hills spaced from 8 to 10 feet apart each way. The plants are thinned to 2 to 4 to a hill when danger from insects is passed. Another plan is to drill the seed two or more inches apart in rows from 10 to 12 feet apart. The plants thinned to stand 3 feet apart in the row. The seed is covered two inches in light soil and not over an inch in heavy soil.



WATERMELON (COLES)

Two to three pounds of seed is used per acre for hills and four to five in drills. Seed is used liberally as the cucumber beetle destroys many young plants.

Fertilizing.—Fertilizing is practically the same as for muskmelons. In the North, fresh manure in the hill, covered three inches deep with soil will ferment and furnish heat which will hasten germination and early growth of the plants.

Cultivation.—The same cultivation is required as for muskmelons. Stir the soil in the hills after rains to prevent crust forming on the surface.

Harvesting.—Watermelons for market must be picked at the proper stage of maturity and this is a very difficult matter to determine. Experience alone makes it possible to tell when a watermelon is ready to be picked and marketed. Sounding the melons and cutting them occasionally for table use will enable the grower to become an adept. The fruit is cut from the vine with about two inches of stem and a disinfectant applied to the stem to prevent stem rot.

If the fruit is overripe it will not carry well and the quality will be poor. If underripe the quality will also be poor.

When picked, the melons are placed in rows in the field and then hauled to market or loaded on cars, from 800 to 1,500 in a car.

Varieties.—For home use personal preference only is to be considered. For local markets quality and yield are the most important considerations. For shipping, not only the quality of the fruit, but its shipping qualities are important. Medium sized melons are in greater demand than very large specimens. Earliness is important where the growing season is short.

New varieties are offered frequently.

Fordhook Early will ripen in sections where the season is too short for any other. Fruit oblong, dark green skin, flesh red of fine flavor.

Cole's Early has a green skin, striped white. It is very early. The fruit is small, round, light pink flesh of good flavor. For home use and local markets. Will not stand shipping.

Kleckley Sweet is desirable for home use and local markets. Fruits oblong, thin rind and thick flesh, averaging 18 inches long and 10 inches in diameter. Does not ship well.

Tom Watson is a tough rind shipping melon. The melons frequently measure 18 inches or more in length and 12 inches in diameter weighing 50 pounds. The rind is thin but tough. The flesh is deep red. Quality good.

WATERMELON (TOM WATSON)

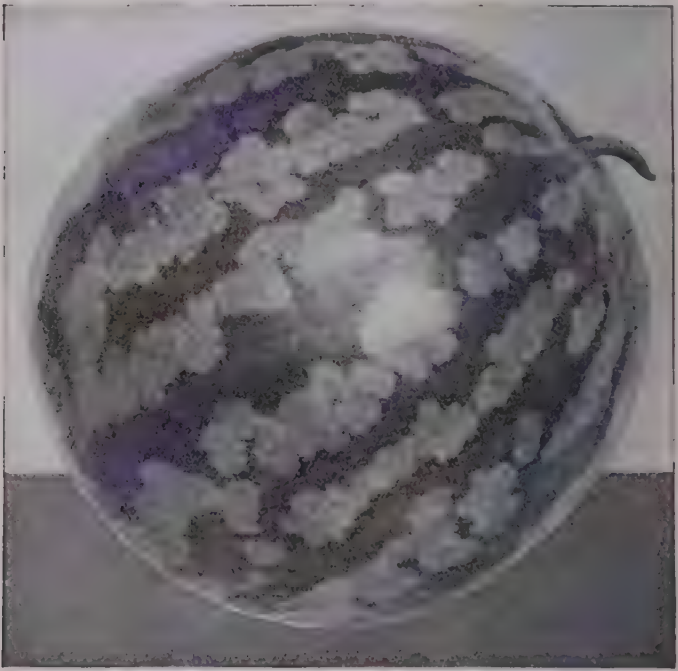
Perfection is a good shipper. It is a large melon weighing from 50 to 75 pounds. The rind is thin, but very tough, of a glossy dark green. The flesh is dark red, sweet and free from fibre.

Alabama Sweet is a Southern favorite. Oblong, dark green, red flesh of good flavor. Good shipper.

Rattlesnake or Gypsy Striped, oblong, striped and mottled.

Large size; rind thick and solid. Flesh red and of good quality. Ships well. Popular in the South.

Kolb's Gem is a standard market shipping melon. Oval, rind thick and tough. Flesh sweet and of good flavor but coarse. Early.



CITRON OR PRESERVING MELON

Citron or Preserving Melon.—Fruit resembles a round watermelon. The rind is used for pickling and conserve. It is also fed to hogs.

Insects.—Aphis are troublesome to watermelons, also other insects which are discussed under cucumber.

Diseases.—Wilt. Vines suddenly wilt beginning at the tips, one branch after another wilting until the plant is dead. The organism causing this disease, lives in the soil and comes up through the water-conducting tissues, which become stopped up and the plant dies.

Rotation of crops is recommended; avoidance of stable manure; drainage to prevent water from infected fields running on to the beds; resistant varieties.

Where land is affected it should not be used again for melons for 10 or 12 years. Stables become infected from portions of the vines and the organisms grow well in stable manure. Live-stock may spread the disease if permitted to roam. There is as yet, no satisfactory wilt-resistant melon.

Anthracnose affects the leaves, vines and fruit. Dark spots appear on the leaves and stems. The leaves die. Small spots appear on the fruit becoming sunken and covered with pink spores.

Spray the vines with a 4-4-50 Bordeaux, 4 pounds, copper sulphate, 4 pounds hydrated lime and 50 gallons of water, as soon as they begin to run, again a week after the fruit has set and again two weeks later.

Root Knot is produced by nematodes. See cabbage for remedy.

Stem-end Rot. This disease has caused serious loss in transit. The stem may brown and shrivel. The same decay may appear on the side of the fruit, if the skin is broken.

Clean up the fields, gathering and destroying all cull melons. Spray as for anthracnose as the fungus grows on leaves and stems killed by anthracnose. Disinfect the stem when loading the car, with starch paste containing copper sulphate.

The paste is made by taking 3½ quarts of water and 8 ounces of copper sulphate, bringing the mixture to a boil. Mix 4 ounces of starch with a pint of cold water, stirring until all the starch is dissolved. When the copper sulphate is dissolved, add the starch, pouring slowly and stirring vigorously to keep lumps from forming. Continue boiling until the starch thickens evenly. Keep the paste in a covered receptacle such as a fruit jar and make fresh every week.

Cut off a portion of the stem end at the core and apply a dab of paste.

Ground Rot is common in the South, appearing on the side of the fruit in contact with the soil. No remedy is known other than to watch the crop and promptly destroy diseased fruits.

Destroying diseased fruits or plants does not mean stamping on them with the heel and leaving them in the field. Diseased plants and parts of them cannot be too effectively and completely destroyed. Wholly consuming by fire is the best plan. It may make a little extra work, but on the other hand it will save a lot of labor, trouble and loss, later on.

Chapter 10

PLANTING AND SEED TABLES

SEASON FOR SOWING VEGETABLES IN OPEN GROUND

First Period.—Peas. With the blooming of peach trees.

Second Period.—Peas, Spinach, Lettuce, Corn Salad, Onion sets.

Third Period.—All the above and Radish, Celery, Carrot, Beet, Mustard, Onion seed, Parsley, Cabbage, Parsnip and Tomato seed, with the blooming of the pear.

Fourth Period.—All the preceding and Beans, Salsify, Corn, Cucumber, Pumpkin, Melon and Okra with the blooming of the apple.

Above is an old garden rule, but experience will show gardeners about how much it can be varied.

QUANTITY OF SEED REQUIRED TO PLANT AN ACRE

Alfalfa, broadcast	20 to 25 lbs.
“ in drills	15 “ 20 “
Asparagus	4 “ 5 “
Barley	8 “ 10 pks.
Bean, dwarf, in drills	1½ bu.
“ field, small	3 pks.
“ “ large	6 “
“ pole, in drills	12 qts.
“ Velvet	4 pks.
Beet	5 to 6 lbs.
“ Sugar	20 lbs.
Blue Grass	25 “
Brome Grass, for pasture	16 to 20 lbs.
“ “ for hay	14 lbs.
Broom Corn	3 pks.
Brussels Sprouts	2 oz.
Buckwheat	4 to 5 pks.
Cabbage	½ lb.
Carrots	4 lbs.
Cauliflower	1 oz. for 1,000 plants
Celery	1 oz. for 2,000 plants
Clover, Alsike	10 lbs.
“ Crimson, Red	15 “
“ Mammoth	14 “
“ Sweet	2 pks.
“ White	12 lbs.
“ Yellow	5 “
Collards	4 oz.
Corn, in hills	8 qts.
“ for silage	12 “
Cotton	2 to 3 bu.
Cowpea	1½ bu.
Cress, in drills	2 to 3 lbs.
Cucumber, hills	2 lbs.
Eggplant	1 oz. for 1,000 plants
Endive	2 lbs.
Field Peas, large	3 bu.
“ “ small	2½ bu.
Flax	2 bu.
Grass, Lawn	5 “
“ Hungarian	2 pks.
“ Johnson	1 bu.
Hemp	4 pks.
Kafir, in drills	6 lbs.
Kale	2 “
Kohlrabi	3 “
Leek	4 “
Lettuce	1 oz. for 1,000 plants
Lupine	2 bu.
Mangels	6 to 8 lbs.
Meadow Fescue	12 lbs.
Melon, Musk, in hills	3 “
“ Water, in hills	5 “
Millet, Foxtail	2 pks.
“ German	1 pk.
“ Pearl	10 lbs.
Milo	5 “
Mustard, broadcast	½ bu.
Oats	2 to 4 bu.
Okra	8 lbs.
Onions, in drills	6 “
“ for sets	30 “
Onion sets	8 bu.
Orchard Grass	14-28 lbs.
Parsley	3 “
Parsnips	6 to 8 lbs.
Peas, Garden, in drills	2 bu.
Pepper	2 oz.
Popcorn	4 lbs.
Potatoes	16 bu.
Potatoes, Sweet	2 to 4 bu.
Pumpkin	4 lbs.
Radish, in drills	10 “
Rape, in drills	4 “
“ broadcast	5-7 “
Red Top	15 “
Rice	3 bu.
Rutabaga	5 lbs.
Rye	4 to 8 pks.
Rye Grass	3 bu.
Sage, in drills	10 lbs.
Salsify, in drills	10 “
Sheep Fescue	3 bu.
Sorghum, broadcast	2 “
Soybeans, in drills	3 pks.
“ broadcast	5 “
Spinach, in drills	12 lbs.
Squash, in hills	4 “
Sunflower	15 “
Timothy	10 to 20 lbs.
Tobacco. One tablespoon to 100 sq. yds. Plants for 6 acres.	
Tomato	¼ lb. Plants for 1 acre.
Turnip, in drills	2 lbs.
“ broadcast	4 “
Vetch, Hairy, in drills	1 bu.
“ “ broadcast	2 “
Wheat	2 “

FIELD SEEDS

VARIETY	Viability of Good Seed, Per Cent.	Purity of Good Seed, Per Cent.	Average Germination 1 Year Old, Per Cent.	Average Length of Vitality in Years	Legal Weight of Seed per Bushel in Pounds	Actual Weight of Seed per Bushel in Pounds	Quantity Required per Acre in Pounds	Yield of Seed per acre in Pounds	Average Number of Seeds per Pound
Alfalfa	95	98	94	6–8	60	60–63	15–20	300–700	220,000
Bluegrass, Kentucky	70–85	75–85	30–40	1–2	14	14–28	20–30	200–350	2,400,000
“ Canada	85	75–85	30–40	1–2	14	14–24	15	200–500	2,400,000
Brome Grass	90–95	98	85–90	5	14	12–20	10–14	250–350	137,000
Clover, Alsike	98	98	75	2	60	60–65	8–12	100–300	700,000
“ Crimson	98	98	90	2	60	60–63	12–20	200–300	125,000
“ Red	98	98	90	5–6	60	60–63	15	100–300	250,000
“ Sweet	95–98	98	90–95	5	.....	.....	20–30	150–140	225,000
“ White	98	98	75	2	60	60–63	8–12	200–300	700,000
Cowpea	90	98	80	2	60	varies	30–60	900–1,800	150,000
Fescue, Meadow	95	90	93	2	.....	20–30	10–15	200–300	250,000
Millet, Foxtail, Common, Golden, Hungarian, Siberian	90	98	88	4	48–50	40–55	25–50	....	200,000
Orchard Grass	98	97	90	2–3	14	12–22	12–20	140–168	400,000
Rape	95	99	90	6	.....	.....	4	600–1,000	....
Red Top	95	95–98	.....	6	14	12–40	10–20	....	4,135,000
Rye Grass, Perennial	95	98	80	2	.....	10–30	25–35	250–500	335,000
“ “ Italian	95	98	80	2	20	12–24	35–40	500	285,000
Soy Bean	98	99	90	2	60	60	20–30	1,000–2,400	2,100– 6,000
Timothy	98	98	95	5–6	45	42–50	20	225–450	1,175,000
Vetch	95	98	90	3	60	60	40–90	600–720	70,000–80,000

SEED MIXTURE FOR HAY AND PASTURE AND QUANTITY REQUIRED PER ACRE

Mixture No. 1

Timothy	Equal parts 14 to 20 lbs. per acre
Red-top	
Kentucky blue-grass	
Red Clover	

Mixture No. 2

Timothy	3 lbs.
Orchard grass	2 “
Red-top	2 “
Kentucky blue-grass	2 “
Italian rye-grass	1 “
Meadow fescue	2 “
Red clover	4 “
White Clover	2 “

Mixture No. 3

Kentucky blue-grass	8 lbs.
White clover	4 “
Perennial rye-grass	9 “
Red fescue	3 “
Red-top	8 “

For Wet Pasture

Red-top	14 lbs.
Alsike	8 “
Creeping bent	6 “
Perennial rye-grass	12 “

For Sandy Soil

Red fescue	20 lbs.
Red-top	10 “
Kentucky blue-grass	8 “
White clover	2 “

The seed should be thoroughly mixed. This can be done by piling it up on a clean, smooth, tight floor or on canvas spread over a floor, out of draughts or air currents which would blow light seed. With a shovel or wooden scoop, shovel the seed over into another pile. Then reshovel back to the position of the first pile. Repeat the operation several times to obtain a complete and thorough mixture.

WEIGHT OF SEEDS
In Pounds per Bushel

Alfalfa	60
Amber Cane	45–60
Bent Grass, Creeping	10–20
“ “ Rhode Island	10–15
Bermuda Grass	24–36
Blue Grass, Canada	14–24
“ “ Kentucky	14–28
“ “ Texas	14
Broad Bean	50–60
Brome, Awnless	10–14
Broom Corn	45–60
Bur Clover, hulled	60
“ “ unhulled	8–10
“ “ spotted	60
Castor Bean	45–60
Clover, Alsike	60
“ Crimson	60
“ Egyptian	60
“ Mammoth	60
“ Red	60
“ White	60
Cowpea	60
Crested Dog's Tail	14–30
Fescue, Hard	12–16
“ Meadow	20–30
“ Red	12–15
“ Sheep's	12–16
“ Tall	14–24
Flax	48–56
Hemp	40–60
Japan Clover, hulled	60
“ “ unhulled	18–25
Johnson Grass	14–28
Kafir	50–60
Lentil	60
Lupine, White	50–60
Meadow Foxtail	7–14
Meadow Grass, fowl	11–14
“ “ rough stalked	14–20
“ “ wood	14–24
Millet, Barnyard	30–60
“ Broom Corn	45–60
“ Common	48–50
“ German	48–50
“ Hungarian	48–50
“ Pearl	48–56
Oat Grass, Tall	10–14
“ “ Yellow	7–14
Orchard Grass	14
Pea, Field	60
“ Garden, Smooth	60
“ “ Wrinkled	56
Peanut	20–30
Rape, Winter	50–60
Red Top	14
“ “ Fancy	25–40
Rescue-Grass	12–28
Rice	43–45
“ Wild	15–28
Rye-Grass, English	10–30
“ “ Italian	20
Sainfoin	14–32
Serradella	28–36
Soybean	60
Spelt	40–60
Sunflower	24–50
Sweet Clover, hulled	60
“ “ unhulled	33
Sweet Corn*	36–56
Sweet Vernal, Perennial	6–15
Teosinte	40–60
Timothy	45
Velvet Bean	60
Vetch, hairy	60
“ spring	60
Yellow Trefoil	60

* The weight of sweet corn varies according to variety.

The average life of the seed is given in the following table, although some seeds may retain their vitality under favorable conditions for longer. Carrot, for example, has been found viable after ten years, though the average life of this seed is more nearly four or five years. The table gives the approximate number of seeds contained in an ounce. The number will vary, more or less, according to the seed, where grown, its purity, cleanliness and age.

AVERAGE DURATION OF SEED GERMINATING POWER

Quantity and Weight of Seeds

	Weight of a Quart of Seed in Ounces	Number of Seeds to the Ounce	Average Duration of Germinating Power in Years
Angelica	6	3,400	1 to 2
Anise	11	5,600	3
Artichoke	....	600	6
Asparagus	32	1,200	5
Balm	21	56,000	4
Basil	20	22,600	8
“ Bush	....	25,500	8
“ East Indian	....	42,500	8
Beans	24 to 33	13 to 90	6
“ Kidney	....	25 to 200	3
Beet	10	1,000	6
“ Leaf or Chard	....	1,500	6
Borage	18	1,800	8
Borecole or Kale	26	6,000	5
Broccoli	26	10,500	5
Brussels Sprouts	24	5,000	5
Cabbage	25	8,500	5
“ Chinese, Pe-tsai	....	8,500	5
“ “ Pak-choi	....	8,500	5
Caper	17	4,500	......
Capsicum	....	4,250	4
Caraway	16	9,500	3
Cardoon	24	700	6
Carrot, with the spines	9	19,500	4 to 5
“ without the spines	13	25,000	4 to 5

	Weight of a Quart of Seed in Ounces	Number of Seeds to the Ounce	Average Duration of Germinating Power in Years
Catnip	26	34,000	5
Cauliflower	25	8,000	5
Celery	17	70,000	8
Chervil	15	12,750	2 to 3
“ Sweet-scented	9	1,150	1
“ Turnip-rooted	20	12,750	1
Chicory	18	19,750	8
Collards	....	5,000	5
Coriander	12	2,550	6
Corn	24	140	2
Corn-salad	10	20,000	5
Cress, American	20	26,000	3
“ Garden	28	12,750	5
“ Para	7	95,000	5
“ Water	22	110,000	5
Cucumber	18	900	6
“ Gherkin	20	3,600	6
Dandelion	10	34,000	2
Dill	11	25,500	3
Egg plant	18	7,000	5
Endive	12	17,000	3
Fennel, Common or Wild	17	8,500	4
“ Sweet	9	3,500	4
Gumbo. See Okra			
Hop	9	5,600	2
Horehound	26	28,000	3
Hysop	22	24,000	3
Kale. See Borecole			
Kohlrabi	25	8,500	5
Leek	21	11,000	3
Lentils, Broad White	....	375	4
“ Small White	....	1,000	4
“ Green	....	1,100	4
Lettuce	16	18,000	5
Maize. See Corn			
Marjoram, Sweet	22	100,000	3
“ Winter	25	330,000	5
Martynia	11	500	1 to 2
Muskmelon	13	900	5
Mustard, Black or Brown	25	19,750	4
“ Chinese Cabbage Leaved	24	16,000	4
“ White or Salad	28	5,600	4

	Weight of a Quart of Seed in Ounces	Number of Seeds to the Ounce	Average Duration of Germinating Power in Years
Nasturtium, Tall	13	200	5
" Dwarf	23	425	5
Okra or Gumbo	20	500	3
Onion	18	6,000	2
Parsnip	7	6,000	2
Parsley	19	8,000	3
Peas, Garden	25 to 30	40 to 150	3
" Field	23 to 30	120 to 250	3
Peanut	15	28	1
Pepper	16	4,250	4
Pumpkin	9	125	6
Radish	25	2,000	5
Rhubarb	3 to 4½	1,200	3
Rosemary	15	22,000	4
Rue	22	14,000	2
Sage	20	7,000	3
Salsify	8	2,000	2
Savory, Summer	18	30,000	3
" Winter	15	55,000	3
Sea-kale	8	425	1
Sorrel	....	20,000	2
Soy Bean	....	175	2
Spinach, Prickly Seeded	13	2,500	5
" Round Seeded	15	3,100	5
" New Zealand	8	280	5
Squash, Hubbard	14	100	6
" Summer	20	250	4
Strawberry Tomato, *Physalis*	25	20,000	8
Swiss Chard. See Beet, Leaf or Chard			
Tansy	11	175,000	2
Thyme	25	160,000	3
Tomato	11	10,000	4
Turnip	24	6,000	5
Watermelon	16	100	8
Wormwood	25	250,000	4

The following table gives about the average percentage of germination of fresh seed, when planted under proper conditions.

GERMINATION OF FRESH SEED

Average Percentage when Planted under Proper Conditions

Artichoke	80
Asparagus	84
Barley	90
Bean	95
Bean, Lima	90
Beet*	135
Beet, Mangels and Sugar	180
Broccoli	90
Broom Corn	90
Brussels Sprouts	90
Buckwheat	90
Cabbage	90
Carrot	75
Cauliflower	90
Celeriac	75
Celery	70
Clover	90
Chicory	70
Collards	90
Corn	92
Corn, Pop	90
Corn, Sweet	85
Cucumber	85
Dandelion	70
Egg Plant	60
Endive	70
Grass Seed	70
Kale or Borecole	90
Kohl-rabi	90
Leek	85
Lettuce	85
Martynia	70
Muskmelon	85
Mustard	90
Okra or Gumbo	75
Onion	80
Parsley	70
Parsnip	70
Pea	90
Pepper	65
Pumpkin	85
Radish	90
Rape	90
Rhubarb	80
Rye	95
Salsify	75
Sea-Kale	175
Spinach	80
Squash	80
Sunflower	92
Timothy	92
Tobacco	75
Tomato	85
Turnip	90
Turnip, Rutabaga	90
Vetches	95
Wheat	95
Watermeon	80

*Beet seed as sold is a fruit containing more than one seed.

Testing Seed.—Seed may be tested for germination in the following manner: Place cotton batting in a saucer or in the bottom of a tumbler and moisten it. On this place exactly 100 seeds to be tested, keep in a warm room and they will soon germinate. The number that germinate gives the percentage of germination or good seed.

The best way to test seeds is in soil, in a shallow box, such as gardeners call a flat. Use a light loam with a mixture of sand. Dampen the soil well, then cover with about an inch of sand which has been baked and allowed to cool. Sow the seeds at a uniform depth and space evenly. Keep in a warm room or in a greenhouse. Let the seedlings grow until they show whether they will make strong or weak plants. A seed may sprout and be so weak as to be worthless for planting.

Large seeds can be germinated between moist folds of cloth. Medium sized seeds may be germinated on blotting paper, kept warm and moist on a plate or saucer. Ordinary living room temperature, from 68° to 70° F., is sufficient.

Small seeds may be laid on a blotter and this covered with a blotter, both slightly moistened, laid on a plate and covered with a smaller plate, to prevent too rapid evaporation.

Clover seed germinates in five days, while twenty-eight days will be required to complete a test of bluegrass seed.

Variable results may be obtained from the same lot of seed. Duplicate trials will show some variation which may be caused by conditions of moisture, heat or other causes than the condition of the seed.

PLANTING TABLES

Planting dates vary according to latitude. Different locations in the same latitude will vary somewhat, affected by altitude, character of soil, etc. Depth of planting and distance apart of plants and rows also vary. At best tables are useful only as a guide for the planter, which must be modified to fit local conditions which experience alone will prove best.

The tables given have been derived from many sources, including bulletins of various State Experiment Stations.

DATES FOR SOWING AND SETTING OUT VEGETABLES

Michigan Experiment Station

Beans, bush	May	16
“ pole	“	30
Beet	April	20
Broccoli	May	10
Brussels Sprouts	“	10
Cabbage, early, in hot bed	March	15
“ late	May	20
Carrot	“	7
Cauliflower, in hotbed	March	15
Celery, in hotbed	“	18
“ in garden	May	20
Corn	“	19
Cucumber	“	23
Egg-plant, in hotbed	March	15
Kale	May	9
Kohl-rabi	“	9
Lettuce	May	5
Melon	“	30
Okra	“	15
Onion	April	17
Parsnips	May	7
Peas	April	15
Pepper, under glass	March	16
Potato	May	3
Pumpkin	“	31
Radish	April	26
March 1 under glass		
Salsify	May	7
Spinach	April	10
Squash	May	28
Tomato, under glass	March	13
Turnip	April	15

Cucumbers can be started earlier in hotbeds, the vines protected until the weather is warm.

Lettuce may be started in hotbeds earlier and by gradually hardening them off, the plants can be set out in the open ground by May 5. **Early lettuce** can be grown in hotbeds, sowing the seed the first of March. It will be ready for market in about sixty days.

PLANTING TABLE
OF A NORTHERN NEW JERSEY GROWER

In Latitude of New York City

Seeds to Sow from March 15 to April 30, Thermometer in Shade Averaging 45 Degrees

Beet
Carrot
Cress
Celery
Cabbage
Cauliflower
Endive
Kale
Lettuce
Onion
Parsnip
Parsley
Peas
Radish
Spinach
Turnip

Seeds to Sow from May 15 to June 15 Thermometer in Shade Averaging 60 Degrees

Beans, all kinds
Corn
Cucumber
Melons
Nasturtium
Okra
Pumpkin
Squash
Tomato, set out plants

PLANTING TABLE OF A GROWER AT BOSTON, MASS.

Asparagus	End of April
Beans, Bush	About first week in May
Beans, Pole	Middle of May to first of June
Beans, Lima	First of June
Beet	April 15
Borecole or Kale	April 15. Plant out in June
Brussels Sprouts	March or April in hotbed
Cabbage	Set plants May 1
Carrots	June 1
Cauliflower	Set out plants from May 1 to July 1
Celery	April 1 to July 15
Corn	May 1
Cucumber	Under glass March 15
Eggplant	March 15 in hotbed
Endive	June or July
Kohlrabi	May or June
Okra	May 10
Peas	April 20 to May 1
Pepper	Set out plants April 1
Radish	From April 1 to June 15
Spinach	September 1
Tomato	Set out plants May 25
Turnips for autumn use	July 1 to August 20
Watermelon	May 15

PLANTING AT NORFOLK, VIRGINIA

Beans	March and April
Beets	February and March
Cabbage	Seed started in Aug. and Sept. Plants set out in Nov. and Dec.
Carrots	February and March
Cauliflower	March and April
Celery	April and May
Corn	April to July
Cucumbers	April
Eggplant	April and May
Lettuce	September and January
Melons	April
Onions	Aug. and Sept., Jan. and July
Peanuts	May
Peas	
Peas	Dec. to Apr., Aug. and Sept.
Potatoes	February, March, July
Potatoes, Sweet	May
Radish	Every month
Spinach and Kale	Aug. and Sept.
Squash	April
Tomatoes	April and May

TENDER VEGETABLES

These vegetables are injured by frost or prolonged cold spells in the early season:

Beans
Corn
Cucumber
Eggplant
Melons
Okra
Pepper
Pumpkin
Squash
Sweet Potato
Tomato

These should only be planted or set out in the open after the weather has become settled.

HARDY VEGETABLES

These vegetables when properly treated will endure frost.

Asparagus
Bean, Windsor
Beet
Borecole
Broccoli
Brussels Sprouts
Cabbage
Carrot
Cauliflower
Celery
Corn Salad
Cress
Endive
Horseradish
Kohl-rabi
Kale
Leek
Lettuce
Onions
Parsley
Parsnip
Pea
Radish
Rhubarb
Salsify
Sea-kale
Spinach
Turnip

To Figure the Number of Plants Required to the Acre

To find the number of plants required to plant an acre, multiply the distance apart that the plants are to be set in the rows, by the distance between the rows, then divide 43,560 (the number of square feet to the acre) by the result.

Example.—Suppose the plants are to be set 2 feet apart in the rows, and the rows are 2 feet apart. $2\times 2=4$ feet, $43{,}560 \div 4=10{,}890$, the number of plants required to the acre.

If the plants were to be set one inch apart it would be necessary to multiply 43,560 square feet by 144, the number of square inches in a foot, giving 6,272,640 plants required to the acre if set one inch apart. If set 2 inches by 2 inches apart, multiply $2\times 2=4$ inches, and divide 6,272,640 by the result, 4 which equals 1,568,160.

PLANTING TABLE

Quantity of seeds or number of plants required for a row 100 feet in length, with distances to plant, times for planting and period required for production of crop. Brackets indicate that a late or second crop may be planted the same season.

Kind of vegetable.	Seeds or plants required for 100 feet of row.	Distance for plants to stand.			Depth of planting.	Time of planting in open ground.		Ready for use after planting.
		Rows Apart.		Plants apart in rows.		South.	North.	
		Horse Cultivation	Hand Cultivation					
Artichoke, Globe.	½ ounce	2 to 4 ft.	2 to 3 ft.	2 to 3 ft.	1 to 2 in.	Spring	Early spring	15 months.
Artichoke, Jerusalem	2 qts. tubers	1 to 4 ft.	1 to 2 ft.	1 to 2 ft.	2 to 3 in.	Spring	Early spring	6 to 8 months
Asparagus, seed	1 ounce	1 to 3 ft.	1 to 2 ft.	3 to 5 in.	1 to 2 in.	Autumn or early spring	Early spring	3 to 4 years.
Asparagus, plants.	60 to 80 pl	1 to 5 ft.	12 to 24 in.	15 to 20 in.	3 to 5 in.	Autumn or early spring	Early spring	1 to 3 years.
Beans, bush	1 pint	30 to 36 in.	18 to 24 in.	6 to 1 ft.	½ to 2 in.	February to April. [August to September.]	April to July	40 to 65 days.
Beans, pole	½ pint	3 to 4 ft.	3 to 4 ft.	3 to 4 ft.	1 to 2 in.	Late spring	May and June	50 to 80 days.
Beets	2 ounces	24 to 36 in.	12 to 18 in.	5 to 1 ft.	1 to 2 in.	February to April. [August to September.]	April to August	60 to 80 days.
Brussels sprouts	¼ ounce	30 to 36 in.	24 to 30 in.	16 to 24 in.	½ in.	January to July	May and June	90 to 120 days.
Cabbage, early	¼ ounce	30 to 36 in.	24 to 30 in.	12 to 18 in.	½ in.	October to December	March and April. (Start in hotbed during February.)	90 to 130 days
Cabbage, late	¼ ounce	30 to 40 in.	24 to 36 in.	16 to 24 in.	½ in.	June and July	May and June	90 to 130 days
Cardoon	½ ounce	3 ft.	2 ft.	12 to 18 in.	1 to 2 in.	Early spring	April and May	5 to 6 months.
Carrot	1 ounce	30 to 36 in.	18 to 24 in.	6 to 1 ft.	½ in.	March and April. [September.]	April to June	75 to 110 days
Cauliflower	¼ ounce	30 to 36 in.	24 to 30 in.	14 to 18 in.	½ in.	January and February. [June.]	April to June. (Start in hotbed during February or March.)	100 to 130 days
Celeriac	¼ ounce	30 to 36 in.	18 to 24 in.	4 to 5 to ft.	⅛ in.	Late spring	May and June. (Start in coldframe during April.)	100 to 150 days.
Celery	¼ ounce	3 to 6 ft.	18 to 36 in.	4 to 8 in.	⅛ in.	August to October	May and June. (Start in hotbed or coldframe during March or April.)	120 to 150 days.
Chervil	1 ounce	30 to 36 in.	18 to 24 in.	3 or 4 to ft.	1 in.	Autumn	Autumn	1 year.
Chicory	¼ ounce	30 to 36 in.	18 to 24 in.	4 or 5 to ft.	½ in.	March and April	May and June	5 to 6 months.
Citron	1 ounce	8 to 10 ft.	8 to 10 ft.	8 to 10 ft.	1 to 2 in.	March and April	May and June	100 to 130 days.
Collards	¼ ounce	30 to 36 in.	24 to 30 in.	14 to 18 in.	½ in.	May and June	Late Spring	100 to 120 days.
Corn salad	2 ounces	30 in.	12 to 18 in.	5 or 6 to ft.	½ to 1 in.	January and February. [September & October.]	March to September	60 days.
Corn, sweet	¼ pint	36 to 42 in.	30 to 36 in.	30 to 36 in.	1 to 2 in.	February to April	May to July	60 to 100 days.
Cress, upland	½ ounce	30 in.	12 to 18 in.	4 or 5 to ft.	½ to 1 in.	January and February. [Autumn.]	March to May. [September.]	30 to 40 days

Cress, water	½ ounce	Broadcast			On surface	Early spring	April to September	60 to 70 days.
Cucumber	½ ounce	4 to 6 ft.	4 to 6 ft.	4 to 6 ft.	1 to 2 in.	February and March. [September.]	April to July	60 to 80 days.
Dandelion	¼ ounce	30 in.	18 to 24 in.	8 to 12 in.	½ in.	Early spring or autumn.	Early spring	6 to 12 months
Eggplant	½ ounce	30 in.	24 to 30 in.	18 to 24 in.	½ to 1 in.	February to April	April and May. (Start in hotbed during March.)	100 to 140 days
Endive	1 ounce	30 in.	18 in.	8 to 12 in.	½ to 1 in.	February to April	April. [July]	90 to 180 days
Horse-radish	70 roots	30 to 40 in.	24 to 30 in.	14 to 20 in.	3 to 4 in.	Early spring	Early spring	1 to 2 years.
Kale, or borecole	¼ ounce	30 to 36 in.	18 to 24 in.	18 to 24 in.	½ in.	October to February	August and September. [March and April.]	90 to 120 days
Kohl-rabi	¼ ounce	30 to 36 in.	18 to 24 in.	4 to 8 in.	½ in.	September to March	March to May	60 to 80 days.
Leek	½ ounce	30 to 36 in.	14 to 20 in.	4 to 8 in.	1 in.	May to September	March to May	120 to 180 days
Lettuce	½ ounce	30 in.	12 to 18 in.	4 to 6 in.	½ in.	September to March	March to September	60 to 90 days.
Melon, muskmelon	½ ounce	6 to 8 ft.	6 to 8 ft.	Hills, 6 ft.	1 to 2 in.	February to April	April to June. (Start early plants in hotbed during March.)	120 to 150 days
Melon, watermelon	1 ounce	8 to 12 ft.	8 to 12 ft.	Hills, 10 ft.	1 to 2 in.	March to May	May and June	100 to 120 days
Mustard	¼ ounce	30 to 36 in.	12 to 18 in.	4 or 5 to ft.	¼ inch	Autumn or early spring	March to May. [September.]	60 to 90 days.
New Zealand spinach	1 ounce	36 in.	24 to 36 in.	12 to 18 in.	1 to 2 in.	Early spring	Early spring	60 to 100 days.
Okra, or gumbo	2 ounces	4 to 5 ft.	3 to 4 ft.	24 to 30 in.	1 to 2 in.	February to April	May and June	90 to 140 days
Onion, seed	1 ounce	24 to 36 in.	12 to 18 in.	4 or 5 to ft.	½ to 1 in.	October to March	April and May	130 to 150 days
Onion, sets	1 quart of sets	24 to 36 in.	12 to 18 in.	4 or 5 to ft.	1 to 2 in.	Early spring	Autumn and February to May.	90 to 120 days
Parsley	¼ ounce	24 to 36 in.	11 to 18 in.	3 to 6 in.	⅛ inch	September to May	September and early spring.	90 to 120 days
Parsnip	½ ounce	30 to 36 in.	18 to 24 in.	5 or 6 to ft.	½ to 1 in.		April and May	125 to 160 days
Peas	1 to 2 pints	3 to 4 ft.	30 to 36 in.	4 in.	2 to 3 in.	September to April	March to June	40 to 80 days.
Pepper	⅛ ounce	30 to 36 in.	18 to 24 in.	15 to 18 in.	½ in.	Early spring	May and June. (Start early plants in hotbed during March.)	100 to 140 days
Physalis, strawberry tomato.	⅛ ounce	30 to 36 in.	18 to 24 in.	18 to 24 in.	½ in.	March to May	May and June	130 to 160 days
Potato,	5 lbs. (or 9 bu per acre.)	30 to 36 in.	24 to 36 in.	14 to 18 in.	4 in.	January to April	March to June	80 to 140 days.
Potato, sweet	3 lbs. or 75 slips.	3 to 5 ft.	3 to 5 ft.	14 in.	3 in.	April and May	May and June. (Start plants in hotbed during April.)	140 to 160 days
Pumpkin	½ ounce	8 to 12 ft.	8 to 12 ft.	Hills, 8 to feet.	1 to 2 in.	April and May	May to July	100 to 140 days
Radish	1 ounce	24 to 36 in.	12 to 18 in.	8 to 12 ft.	½ to 1 in.	September to April	March to September	20 to 40 days.
Rhubarb, seed	½ ounce	36 in.	30 to 36 in.	6 to 8 in.	½ to 1 in.		Early spring	2 to 4 years.
Rhubarb, plants	33 plants	3 to 5 ft.	3 to 5 ft.	3 ft.	2 to 3 in.		Autumn or early spring	1 to 3 years.
Ruta-baga	¼ ounce	30 to 36 in.	18 to 24 in.	6 to 8 in.	½ to 1 in.	August and September	May and June	60 to 80 days.
Salsify	1 ounce	30 to 36 in.	18 to 24 in.	2 to 4 in.	½ to 1 in.		Early spring	120 to 180 days
Spinach	1 ounce	30 to 36 in.	12 to 18 in.	7 or 8 to ft.	1 to 2 in.	September to February	September or very early spring.	30 to 60 days.
Squash, bush	½ ounce	3 to 4 ft.	3 to 4 ft.	Hills 3 to 4 ft	1 to 2 in.	Spring	April to June	60 to 80 days.
Squash, late	½ ounce	7 to 10 ft.	7 to 10 ft.	Hills 7 to 9 ft	1 to 2 in.	Spring	April to June	120 to 160 days
Tomato	⅛ ounce	3 to 5 ft.	3 to 4 ft.	3 ft.	½ to 1 in.	December to March	May and June. (Start early plants in hotbed during February and March.)	100 to 140 days
Turnip	½ ounce	24 to 36 in.	18 to 24 in.	6 or 7 to ft.	¼ to ½ in.	August to October	April. [July.]	60 to 80 days.
Vegetable marrow	½ ounce	8 to 12 ft.	8 to 12 ft.	Hills 8 to 9 ft	1 to 2 in.	Spring	April to June	110 to 140 days

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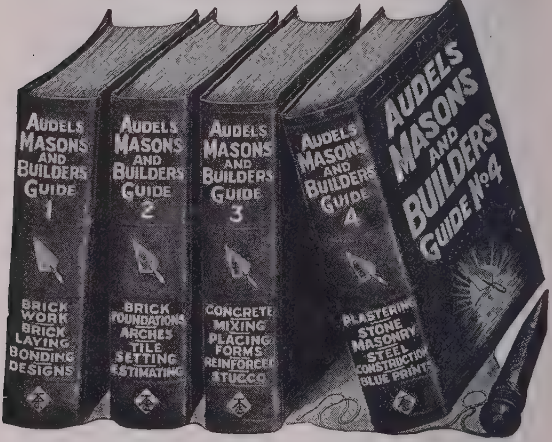
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